THE

Practical Teacher

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Edited by JOSEPH HUGHES.

'Knowledge is proud that he has learned so much,
Wisdom is humble that he knows no more.'—COWPER.

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Pestalozzi.

BY THE REV. CANON WARBURTON, M.A.,

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CHAPTER VI.—*continued.*

It was, indeed, a rare combination of gifts! The famous writers on education who preceded him had been, for the most part, philosophers and theorists, and had left to others the practical task of carrying their principles into effect. His own master, Rousseau, after elaborating a scheme for the education of an imaginary son, 'Emile,'* in such affectionate and touching detail, had allowed his own children to be brought up in a foundling hospital. Pestalozzi's strength lay in the two extremes—in an instinctive knowledge of the way by which to win the confidence and the affections of the individual child, and in deep and far-reaching research into the scientific principles of intellectual and moral culture. To revert to our illustration of the architect, Pestalozzi may indeed be said to have understood the composition of a brick and the way to handle it,—in planning lofty and enduring thought-edifices, he was in his element still; but between moulding bricks and designing palaces there lies a whole region of practical activity, skill, and knowledge requisite for success, and in this region he was no better than an old woman or a child. We have his own confession that 'in spite of his grand ideals embracing the destinies of the whole human race, he did not possess the knowledge and ability requisite for conducting a village school.'† His life was therefore a succession of failures and disappointments, notwithstanding his rare natural endowments and his single-hearted devotion to the highest and most unselfish objects.

It is important to bear in mind the causes of Pestalozzi's ill-success as a schoolmaster, because that ill-success has brought discredit on his system, and given rise to the idea that it is unsound, or at the best, unpractical—a charge which is sufficiently refuted by the fact of the survival, or perhaps we should rather say the successive revivals, of his principles. His position in the history of Education would seem to be this:—On the manner of teaching particular subjects his influence was partial and comparatively unimportant; but he compelled the educational world to revise the whole of their task, to take into their perview the ultimate destiny of man, and the means of leading him from his youth upwards straight towards that destiny. 'I find the battle raging,' says Pestalozzi, 'about particular and isolated systems of instruction; the mind is filled with fragments of truth, while the very spirit of truth itself is quenched; we have forms, not so much of thinking, as of verbal expressions about what has been thought—forms which suck the blood out of good sense, like a marten that fixes itself on the neck of a poor dove. *I* put to myself the question, "What would you do if you wanted to give a single child all the theoretical knowledge and practical skill which he requires in order to attend properly to the great concerns of life, and so attain to inward contentment?"' This passage, taken alone, might almost lead us to suppose that Pestalozzi took such a view of the objects of education as might have commended itself to the mind of an Epicurus or an Antonine; and I have quoted it, partly with a view of correcting that impression, and partly because it forms a fitting introduction to the main topic of this chapter.

His religious teaching.

It is commonly said, by those who have undertaken to expound the 'Principles of Pestalozzi,' that '*the first of those principles is that education must be religious.*' Now it is quite true that, in common with most men of reflection and intelligence, Pestalozzi held that education without religion loses half its depth and value, and more than half its moulding influence and penetrative power; but to say that religion was 'the leading principle,' or even a 'prominent feature' in his system, involves a grave misconception. Nor would it be quite true (though perhaps it might be nearer to the truth) to say, as some have said, that Pestalozzi was an

* See page 3.

† Speaking of the intended opening of a new educational institution, 'I,' says he, 'was to represent the abbot of the monastery; really, in certain respects, I was more fitted to be the donkey, or, at least, the sheep of the monastery than the abbot. My friends, I speak plainly.'

enthusiast whose enthusiasm took the form of subordinating everything to intellectual and moral culture; —that religion was looked upon by him as 'subsidiary to that end,' and that his endeavour was to 'apply Christianity to the business of education.' The fact is that with him religion was an antecedent condition, a presupposed element, apart from which education would be useless or impossible. It was not so much that religion was to be taught, as that everything was to be taught religiously. Thus, for example, the lessons in natural science and history were to be of such a character, that the child himself could not fail to *infer* the necessity of a Final Cause and an overruling Providence. The works of God were to be successively presented in such vivid and attractive colours to the mind of the learner, that childish wonder should gradually brighten into admiration, and admiration warm into love. And 'there were to be not only religious lessons, but religious influence, and religious example; religion in spirit, in aims, in methods, in associations, in principles, in practice.'

All this is as it should be, but here again Pestalozzi's actual practice fell lamentably short of his ideal. At Yverdun, if we are to believe the testimony of more than one of his own pupils, religion was far too much 'presupposed,' and too little inculcated. Moreover the religion which is said to have 'pervaded the institution' was a religion of the feelings,—ignoring the corruption of human nature, ignoring doctrine, almost ignoring Scripture, and deriving no strength or authority either from church tradition or from sacramental communication of grace. In fact, Pestalozzi's own religious views were for a long period of his life dim and unsettled in the extreme, and though they cleared and brightened with his advancing age, they were never wholly free from the transcendentalism and haziness which are supposed, rightly or wrongly, to be characteristic of Teutonic Protestantism.

(To be continued.)

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Our Certificate Class.

BY DR. GEORGE BEACH, M.A.

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DOMESTIC ECONOMY.

The name of this subject might with some propriety discard its adjective and stand alone as 'Economy,' for this word itself means the regulation of a household.

Schoolmistresses have been frequently reproached with knowing nothing of the art, and but a mere 'smattering' of the science of Domestic Economy.

We believe this censure to be without sufficient foundation, for 'only a per centage of the marks will be given for this paper in the case of those students who do not present a certificate, signed by the college superintendent, to the effect that she is satisfied with their practical efficiency in some specified portion of the work usually comprehended under the name of Industrial Training.'

In fact, it has been asserted, that in some colleges this necessity for practical knowledge is utilised as a pretext for imposing a certain amount of drudgery upon the students, especially in the way of laundry work.

Against the Syllabus itself, and the questions based thereon, no fair complaint can be lodged, the knowledge required being essential, and the tests imposed very fair ones.

It should be noted that the term 'Household Management,' added to the last Syllabus, immensely increased the area of study. Until 1886, 'the laws of health as applied to school premises, scholars, and teachers' were demanded; but with greater propriety these are now required under the head of School Management.

In short, as the teacher legally and actually stands towards the scholar '*in loco parentis*,' who can draw a line of demarcation between the school and the home, School Management and Domestic Economy?

As a rule twelve questions are propounded, of which eight may be answered. No portion of the Syllabus is left untested, and several questions are generally addressed to common sense and practical experience. *The first year's course is also revised.*

It is, moreover, most affecting to note with what touching solicitude a paternal department watches over the lone schoolmistress (always assumed to be dedicated to livelong spinsterhood), brooding over her mental and bodily habits, her meals, her disposal of superabundant cash, her longevity, and even insisting on the need of relaxation and holidays. Considerable attention is also directed to the teaching of cooking in elementary schools.

Food, Beverages, Cooking, &c.—Questions have been asked respecting the constituents of common articles of food, the value of a fish diet, non-nitrogenous diets, what diets will produce warmth, fat, vigour, muscle and bone; the different methods of cooking meat, the evils of bad cooking, defects of ordinary domestic cooking, scientific objects of cooking, French versus English cooking, penny dinners for school children, several economical family dinners, how to cook herring, mackerel, cod, plaice, potatoes and beans, how to make bread, beef-tea, mutton-broth, pea-soup, Irish stew, plum pudding and apple pie, different methods of stewing (whether to cook meat or make soup); the impurities of water and their remedies, cookery classes, provision of fuel and apparatus for them, cookery teacher's salary, scheme of lessons for class, materials for demonstration lessons, disposal of cooked dishes, the resulting benefit; scheme of lessons on cottage cookery, on sick cookery, schemes of lessons for the stages of Domestic Economy as a 'specific'; the merits of closed versus open fire places, the utensils required for class and home cookery, the action of the liver and lungs upon food and air, the qualifications of a good sick nurse, and rules for managing a sick-room.

Clothing, &c.—This really belongs more particularly to the First Year Syllabus, but in the Second Year, information has been requested about the animal and other substances used in dress, the means of preparing these, the washing of different fabrics, the different methods of ironing, the colour of clothes, fashions in dress, the arrangements of a laundry, and the qualities and use of borax, soda, ox-gall, chloride of lime, soap, starch, alum, salt, blue, hard and soft water, the temperature of the body, and the necessity of personal cleanliness.

Home, &c.—The candidate has been examined upon ventilation, its best methods, its ordinary defects; upon drainage, with special reference to disconnection, sewer-ventilation and trapping; upon the site, aspect, drainage, elevation and water-supply of dwellings; and has been requested to draw the plans of the ground and upper floors of a working-man's cottage.

Household and School Management.—Queries are propounded concerning the disposal of an artisan's or peasant's daily or weekly wage (the number in family being given); concerning lime-washing versus papering; concerning the history of, and the arguments for and against, vaccination; concerning the causes and symptoms of, and the precautions to be taken against, scarlet and other fevers, cholera, small-pox, diphtheria, measles, whooping-cough, mumps, ringworm, and other infectious or contagious diseases; concerning the ordinary disinfectants, and the steps to be taken in case of croup, nose-bleeding, dog-bite, poisoning, scalds, burns, cuts, wounds, fainting and broken bones.

Investments and Saving.—Inquiries are made relating to high interest and bad security, Government and school savings' banks, Post Office annuities, life insurance, and friendly and co-operative societies. The increased facilities for saving afforded by Government within the last month should be ascertained.

Upwards of two hundred and forty questions have been threshed out to compile the above analysis; and our lady readers may perchance have their confidence in it increased, when we inform them that we write not only from studied theory, but also from an almost unique masculine and practical experience of the various enumerated details.

POLITICAL ECONOMY

may be defined as the science which treats of the nature and operation of the general causes influencing and regulating the production, accumulation, distribution and consumption of things having an exchangeable value, in reference to the effects of such production, accumulation, distribution and consumption upon the national wealth and welfare.

This definition is much more comprehensive than the ordinary ones, and, by including such points as the *distribution* as well as the accumulation of wealth, and the *welfare* in addition to the wealth of the nation, somewhat redeems the science from the charges of cool-bloodedness with which in its infancy it was perhaps justly assailed. According to this definition, a political system which allows immense fortunes to exist side by side with, and perhaps at the expense of, wide-spread destitution—which permits of a monopoly of land whilst multitudes of able-bodied labourers are emigrating, is radically vicious (Pliny says 'Latifundia perdidere Italiam.') Mill says 'Political Economy is more akin to the physical sciences than any other branch of politics. Some people decry it as unfeeling, but it is no more unfeeling than Gravitation, which breaks the neck without scruple of the most amiable person who seriously infringes its laws.' It is not empirical; its laws are as natural as those of Mechanics and Astronomy. Legislation cannot for it create new principles, it can only limit the action of, or allow free scope to, those already naturally operative. Nevertheless, the science is distinctly national in its aspirations; it does not contemplate the welfare of other countries except as subsidiary and conducive to our own. It aims at securing for the fatherland the peculiar advantages distributed throughout the world; but as these are very evenly apportioned, fortunately the patriot and cosmopolitan are not necessarily antagonistic.

In view of the numerous complex social questions, imperatively demanding solution, the Department has acted with unwonted wisdom in including this subject within the certificate curriculum; but we are afraid that as far as elementary schools are concerned (see first question for 1882) the scholars' immaturity of intellect will only allow its principles to be dogmatically inculcated.

The student should read Cassell's 'Laws of every day life,' and 'Citizen Reader,' which although professedly written for the scholars of elementary schools are eminently worthy of more than the casual perusal of everybody.

Our candidates may take it in some instances instead of a second language. Where this is allowed, we should advise them to do so.

Apparently, we are left much in the dark as to the detailed knowledge required, for the Syllabus only states that 'Elementary questions in Political Economy' will be given. It is, however, significant that from 1871 (when Mrs. Fawcett's able little manual appeared) until 1885, the Syllabus said 'Works on this subject published *of late years* for the use of schools, contain matter to which these questions will have reference.'

Our analyses of Mrs. Fawcett's book, and the certificate questions, corroborate the inference, that under the general title 'Works' Mrs. Fawcett's 'Work' was indicated. With a little supplementalising it even now continues the best for our purpose.

Until 1873 any paper which fell below fair was cancelled, but we know that now this regulation has been rescinded, and in any case we trust it could not have affected our students.

In the examination, probably the generous choice of eight out of fourteen questions will be conceded, but the last question (always a Notes of Lesson on one of three given subjects) is practically compulsory, students being '*advised*' to answer it. This is not the only instance where the departmental 'may' is equivalent to 'must.'

One question at least is always a general one, and frequently illustrations from History of ill-effects resulting from the violation of economic laws (such as the attempts to fix the price of labour or commodities, and to obtain both good security and extortionate interest) are requested.

Bearing in mind our former deductions, and despite the taciturn Syllabus, we can readily, from a tabulation and comparison of two hundred and thirty questions, unveil its mysteries.

The area of enquiry being strictly elementary, the questions naturally tend to repeat themselves. For instance, in the 1883 paper, no question appeared which has not been set before or since that date.

It seems likely from current controversies and events, that some of the following questions (all of which have previously done duty) will be re-asked:—'Why am I bound to obey the law?' 'Describe Bi-metallism.' 'Enumerate the recent reforms of taxation.' 'Compare the centralisation with the localisation of Government.' 'Discuss Peasant Proprietorship.' 'What do you know of the theory of Rent?' 'Describe the different systems of Land-tenure.' 'What is Tenant-right?' 'Explain the causes of the existing agricultural depression.' 'Give the arguments in favour of Free Trade.' 'What do you know of Fair Trade and Retaliatory Duties?' 'What is the area of Political Economy, and how do its laws differ from statutory enactments?'

Most of the following points have also been touched upon several times:—

Wealth.—Its production from labour, its natural sources, how it differs from capital, the fallacies of the mercantile system.

Capital.—Necessity for its unequal distribution, fixed and circulating capital, productive and unproductive consumption of capital, luxury versus prodigality, luxury versus necessities, relation of capital to labour.

Labour.—Conditions of efficient labour, division of labour, division of labour versus invention, co-operation of labour, greater produce for less labour really means higher wages, advantages and disadvantages of localising any industry, description of any manufacturing industry, effects upon labour of sanitation and technical education, machinery versus labour, trades unions, strikes, boards of arbitration, co-operative stores, industrial partnerships, Communism, Factory Acts, demand for commodities not necessarily a demand for labour.

Wages.—How nature of occupation affects wages, population versus wages, profit versus wages, poor relief versus wages, Mill's wages fund theory, employers versus employés.

Trade and Commerce.—Supply and demand, monopolies versus competition, benefits of commerce, diversity of productions is the sanction of exchange, free trade is the territorial division of labour, civilising effects of trade, consumer versus producer, law of diminishing returns, balance of trade, exports and imports, value versus price, natural versus market price, fixed legal prices, price of residuals or subsidiaries, profit versus interest, elements of profit, credit, universal system of weights and measures, joint stock companies, effect of war upon economic conditions.

Currency, &c.—The three essential qualities of a true currency, explanation of our use of three metals with a monometallic standard, intrinsic value of currency, appreciation and depreciation of gold, debasement of currency, paper currency, convertible and inconvertible currency, bills of exchange, banking transactions, runs on a bank, savings' banks, savings versus insurance.

Taxes, &c.—The principles of a good tax, direct and indirect tax, income tax—its history, merits and defects, poll taxes, the National Debt, Customs, Poor Rate, Post Office, when should war expenditure be met by loans, and when by taxes.

Land, &c.—Ricardo's theory of rent, margin of cultivation, object of Jewish land laws.

N.B.—Nothing of any importance given during the last eighteen years is omitted from the above analysis.

CORRECTIONS OF LAST MONTH'S ARTICLE.

Page 333, line 37, insert 'two on Book IV.' after the words 'four on Book III.'

Page 333, line 41, read 14 instead of 15.

Page 334, fourth line of 'C,' read $(3x + 4y)$ instead of $(3x + 4)y$.

ANSWERS TO CORRESPONDENTS.

We shall be pleased to reply briefly, and through this column, to any seeking information or advice.

Answers demanding urgency will be promptly forwarded per post on receipt of stamped and addressed envelope.

ADMIRER.—You may expect no formal Parsing or Analysis in the Second Year Grammar Paper for Males, although occasionally you are called upon to 'explain grammatical peculiarities.' Parsing and Analysis were last given at Christmas, 1877.

JOHN S. (Tranmere).—We cannot tell.

J. F. (West Boldon), TIMIDUS (Hartlepool) answered per ordinary post.

ANNO SECUNDO.—(1) In English 'Nominative Absolute'; (2) In Latin 'Ablative Absolute'; (3) In Greek 'Genitive Absolute.'

PUZZLED.—You will find the required information in our first (March) paper.

MASTERMAN READY.—We shall give a series of questions next month.

H. P. S. (Wolverhampton) and T. P. (Stockport).—McLeod's Constitutional History is published by W. Stewart and Co., Holborn Viaduct Steps, price 3s. 6d.

ORGANIST.—Music will be treated of next month.

ROUTINE (GREATLY ALTERED) FOR OCTOBER. (MALES.)

DAY	FIRST WEEK			SECOND WEEK			THIRD WEEK			FOURTH WEEK		
MONDAY	The vital points of the Code. Articles 3, 11, 12, 13, 15, 82, 83, 89, 90, 92, 94, 104, 106, 107, 108, 109, 110, 111. The different circulars. See Heller's Code	Study the Notes in your Euc'id, whether Todhunter or Potts, &c.	Paraphrase Lines 71—92 of Cæsar Act III. Scene 2	Euclid — Deductions of Books III. and IV.	Paraphrase Lines 706—727 of Comus	Revise Geography of England	Summarise Comus' sophistry in favour of voluptuousluxury, and 'the Lady's' reply	Map of Burmah	History — Twenty-seventh chapter of McCarthy	Why should a Teacher of the Young study 'Mental & Moral Philosophy'?	Euclid — Any	Outlines of History to 1837
TUESDAY	Geography of New Zealand	Arithmetic or Algebra	Outlines of History, to end of George II.	Revise Music	History — Twenty-sixth chapter of McCarthy	Draw up a course of ten lessons for First Stage of Mechanics	Revise Grammar from Text-Book	Algebra	Place Bill (1742) Riot Act (1715) Libel Acts (1792, 1843) Reform Bill (1832)	Euclid — Any	The influence of Spenser and Shakespere upon Milton's poetry	Disinfectants
WEDNESDAY	Algebra	Study the points of 'Reasoning' mentioned in our Analysis given in the April No.	Music — The compass and register of voices, voice training	Algebra or Elementary Mensuration	Euclid — Revise any defective portions	Describe the characters of Portia and Lepidus	Euclid — Deductions of Books III. and IV.	Paraphrase from Essay on Milton 'The most fatal error which a poet can possibly commit in the management of his machinery . . . We can reason about it only by symbols'	The 'climates' of our important Possessions. How is our trade affected thereby?	Geography of European Possessions	Arithmetic	History — Revise McCarthy
THURSDAY	Write 30 lines of Composition upon 'Force is no Remedy'	Write a Large-hand copy of 'Fragmentary,' and a Small-hand copy of 'The paths of glory lead but to the grave'	Euclid — Notes in Text-Book	Geography of West African and South American Possessions	Arithmetic	Lives of Wolsey, Burleigh, Raleigh, Hampden, Algernon Sydney, and Marlborough	Proofs of Algebraic Rules	History — Revise McCarthy	Proofs of Algebraic Operations	Revise Preface of Cæsar	Draw rough 'Sketch-maps'	The common errors perpetrated in ordinary Notes of Lessons
FRIDAY	Revise Notes of Cæsar	Revise Geography of I. a, b, c (see syllabus)	Outlines of History to 1793	Relations of the Progressions to each other	Canon Warburton's Article in our September issue on Pestalozzi	Euclid — Any Deductions	Fish and Marine Animals of the various Zones	Euclid — Notes in Text-book	Contrast, from Macaulay's description, The Royalists and the Puritans	Euclid — Any	Macaulay's defence of Milton as regards 'The Great Rebellion,' 'The Execution of Charles,' 'His office under Cromwell'	Maps of Ceylon and Van Diemen's Land
SATURDAY	Important Dates to end of George III.	Re-read Text of Cæsar	Theory of Equations (Quadratic)	Music — 1 Major and Minor Scales 2 Intervals 3 Transposition. — 1 Modes 2 Intervals 3 Bridge-notes and Removes	Revise Notes of Comus; or History (Making of Laws)	'Form VIII. M.' Examination Duplicate and Exception Schedules	Euclid — The different methods of Reasoning employed by Euclid	Music — Time	Geography of Asiatic Possessions excluding India and Burmah	Algebra	Outlines of History to end of George III.	Algebra	Algebra	Important Dates to end of William IV.	Any subject requiring revision	Write out (for future use) a Summary of Canon Warburton's last Article on Pestalozzi

ROUTINE (GREATLY ALTERED) FOR OCTOBER. (FEMALES.)

DAY	FIRST WEEK			SECOND WEEK			THIRD WEEK			FOURTH WEEK		
MONDAY	The vital points of the Code. Articles 3, 11, 12, 13, 15, 82, 83, 89, 90, 92, 94, 104, 106, 107, 108, 109, 110, 111. The various Circulars. (See Heller's Code)	Analyse and Parse difficult words of lines 89-100 of Cæsar, Act I. Scene 3	Revise Geography of the British Isles	Bonaparte's Egyptian and Syrian expedition. Battle of Nile (1798)	Compound and Simple Interest	The various forms of government in our colonies or dependencies	Music — Time	Study the points of 'Reasoning' mentioned in our Analysis given in the April Number	Sketch Maps of British Guiana and the Fiji Isles	Stocks	What do we export to our principal Possessions?	Write an essay of thirty lines upon 'Public Monuments'
TUESDAY	The Administration of Justice. The making of Laws.	Arithmetic — Miscellaneous Problems	Paraphrase lines 93-108 of Cæsar, Act III. Scene 2	Map of English Channel noting specially 'The Channel Islands'	Revise from Text-Book 'Household Expenses'	Particularise the quantity of material (with cost) required for the three specified garments	Music — (1) Major and Minor Scales (2) Intervals (3) Transposition (1) Modes (2) Intervals (3) Bridge notes and Removes	Discount	The Naval and Military Forces of our Empire	History — Dates	Revise 'Food in Common Use' from Text-Book	Any Needlework
WEDNESDAY	Music — The compass and register of voices. Voice training	Draw up a course of ten lessons for 1st Stage of Domestic Economy	Practise Needlework Diagrams	Contrast Pitt's policy before 1793 with his policy after that date	Proofs of Arithmetical Rules	Revise Grammar from Text-Book	Revise any defective Geography	Describe the best manner of (1) preparing (2) boiling, and (3) serving-up a dish of potatoes	Canon Warburton's Article, in our September issue, on Pestalozzi	Addison and the 'Spectator'	Music — (1) Major and Minor Scales (2) Intervals (3) Transposition (1) Modes (2) Intervals (3) Bridge notes and Removes	'Form VIII. M.' Examination and Exception Schedules
THURSDAY	Draw rough 'Sketch Maps'	Pay special attention to button-holing	Stocks	Disinfectants	Revise 'Food in Common Use' from Text-Book	Lives and works of Burke, Paley, Smollett, Sterne, and Savage	Analyse and Parse difficult words of lines 26-40 of Cæsar, Act II. Scene 2	Value of Colonies for (1) Emigration (2) Commerce (3) Civilisation (4) Strategic points	Arithmetic — Miscellaneous Problems	The vulnerable points of our Empire	Explain, using diagrams, the nature and importance in a system of drainage of (1) Trapping (2) Disconnection (3) Ventilation	Arithmetic — Miscellaneous Problems
FRIDAY	Describe fully the process of making bread	Revise any Arithmetic	The Assiento (1713), Granville Sharp, Wilberforce, Clarkson	Paraphrase lines 140-161 of Cæsar, Act I. Scene 2	Any subject requiring revision	The common errors perpetrated in ordinary Notes of Lessons	Revise 'Investments' from Text Book	Give an account of the 'Coolness' between Pope and Addison	Practise Running Tucks and 'Back' Stitching	Why should a Teacher of the Young study 'Mental and Moral Philosophy'?	Re-read the second half of Addison	History. — Outline from Text Book
SATURDAY	Essay on Addison — Wills'. The Grecian, Jonathan's, Garraway's, St. James's, and 'Coffee Houses' of the period	Draw up a short account of the French Revolution noting its effects upon English politics	The principal trade routes between the different portions of our Empire	Write a Large-hand copy of 'Fragmentary,' and a Small-hand copy of 'The paths of glory lead but to the grave'	Compound Proportion	All the Preface to Cæsar	Describe the interior of a Laundry Room, and the vessels and implements required for washing clothes	Practise any Plain Needlework	Vulgar and Decimal Fractions	Revise Preface to Cæsar	Draw the required Needlework Diagrams in your 'Drawing-to-Scale Book'	Revise our French Wars during eighteenth century	History — Dates	Classify our Possessions as obtained by (1) Settlement (2) Purchase (3) Treaty (4) Conquest	Insurance	Write out (for future use) a Summary of Canon Warburton's last article on Pestalozzi

Knitting Maps.

BY MRS. J. D. HARRIS.

LADY'S CANADIAN MUFFLER.

5 Pins. No. 14 Chamber's bell gauge.

2½ oz. of Auchenia wool.

Cast on 24—24—20.

Knit 1, Purl 1, for ½ an inch.

A. Make a row of holes by putting the wool forward and knitting 2 together.

To increase for the Elbow.

B. Knit 12. Pick up a loop and purl it. This is to be the seam stitch down the back of the arm.

In every 4th succeeding round, increase 1 each side the seam stitch till you have 75 stitches in all.

To decrease for the Arm.

C. Knit 2 together each side the seam with 6 rounds between till you have only 63 stitches left.

Knit plain till the arm is 12 inches long.

D. Make a row of holes.
Knit 6 more rounds.

To form the Thumb Gusset.

E. It will now be better to add another pin, as the thumb must of course be exactly opposite the elbow.

Put 15 stitches each side the seam stitch on 1 pin, 12 on the next, 7 on the thumb pin, 12 on the other.

Knit 3 on the thumb pin, make a stitch, knit 1, make a stitch, knit 3.

Knit 2 plain rounds.

N.B.—The increasings for the gusset are always after the first 3 stitches, and before the last 3 on the thumb pin with 2 rounds between each increasing.

Increase till you have 18 stitches in the gusset.

You can now discard the extra pin. Add the 1st 3 stitches and the last 3 to the side pins, making 15 on each. Thread the 18 gusset stitches on a piece of wool, and knit for the hand about 3 inches.

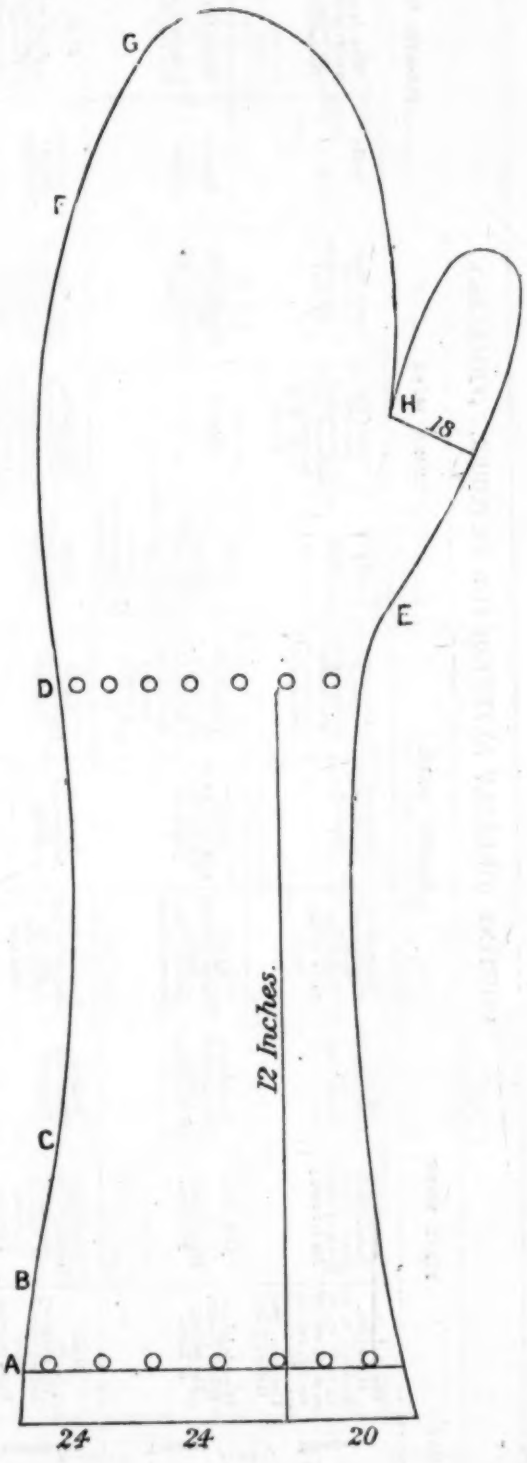
F. Reduce each side the seam stitch 3 times, with 2 rounds between.

G. Knit 2. Knit 2 together all round with one plain round between till you have only 31 stitches left. Put 15 each side the seam stitch, knit together and cast off.

The Thumb.

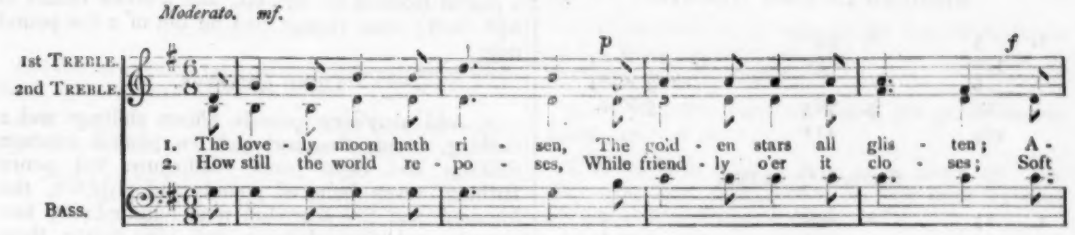
H. Put 7 stitches on the 1st pin, 7 on the 2nd, 4 on the 3rd, add 4 more at the opening. Knit the thumb the length required. Then knit 2, knit 2 together till you have only 9 left, break off the wool, thread the 9 stitches, draw them up and fasten off.

The back of the hand should be embroidered gaily. A ribbon run in at the wrist, and an elastic and bow of ribbon at the elbow. As this muffler is to be worn over the gloves, plenty of room should be be allowed

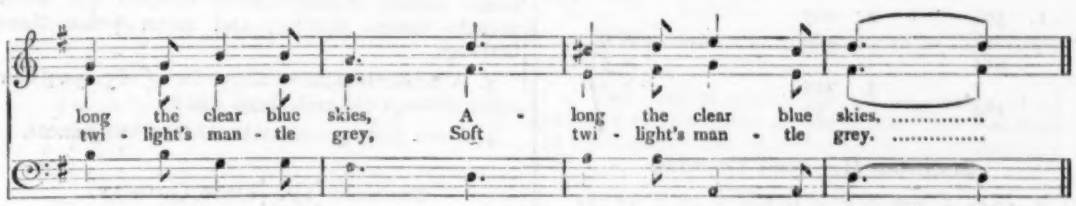


NIGHT.

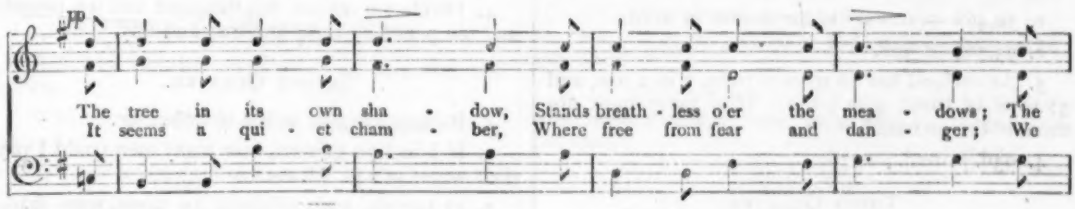
Moderato. *mf.*


1st TREBLE.
2nd TREBLE.
BASS.
p
f
1. The love - ly moon hath ri - sen, The gold - en stars all glis - ten; A-
2. How still the world re - po - ses, While friend - ly o'er it clo - ses; Soft

KEY G. *Moderato.* *mf.* *p* *f*

1st TREBLE.	:s, | d :— :d | m :— :m | s :— :— | m :— :d | r :— :r | r :— :r | r :— :— | t, :— :s,
2nd TREBLE.	:m, | m, :— :m, | s, :— :s, | s, :— :— | s, :— :s, | s, :— :s, | s, :— :s, | t, :— :— | s, :— :s,
BASS.	:d | d :— :d | d :— :d | d :— :— | d :— :m | f :— :f | f :— :f | f :— :— | f :— :f

D.t.

	d :— :d | m :— :m | s :— :— | d' :— :— | t :— :d' | r' :— :t | d' :— :— | d' :—
	s, :— :s, | s, :— :s, | d :— :— | m :— :— | r :— :m | f :— :r | m :— :— | m :—
	m :— :m | d :— :d | m :— :— | d :— :— | s :— :s | s, :— :s, | d :— :— | d :—


pp
The tree in its own sha - dow, Stands breath - less o'er the mea - dows; The
It seems a qui - et cham - ber, Where free from fear and dan - ger; We

f.G. pp

:d' s	s :— :s | s :— :s | s :— :— | f :— :f | f :— :f | f :— :f | f :— :— | m :— :m
:m t,	d :— :d | d :— :d | t, :— :— | t, :— :t, | t, :— :t, | s, :— :s, | s, :— :— | s, :— :s,
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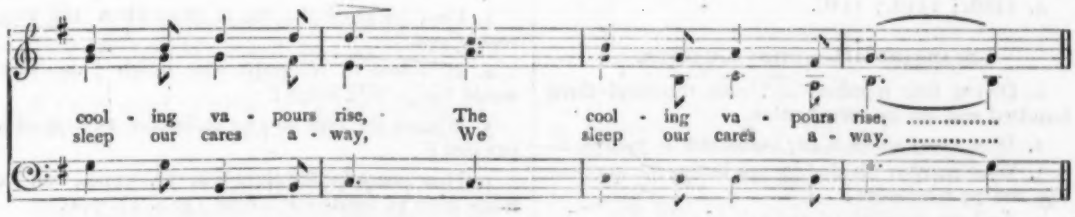
	m :— :m | s :— :s | s :— :— | f :— :— | m :— :d | r :— :t, | d :— :— | d :—
	d :— :d | d :— :t, | l, :— :— | r :— :— | d :— :m, | f, :— :r, | m, :— :— | m, :—
	d :— :d | m, :— :m, | f, :— :— | f, :— :— | s, :— :s, | s, :— :s, | d :— :— | d :—

Quarterly Arithmetical Tests.

STANDARD I.—FIRST QUARTER.

1. 5
370
6
82
409

2. 592
50

3. 783
412

4. 10 × 2;
3 × 8;
5 × 4.

SECOND QUARTER.

1. 27
4
613
890
35

2. 836
54

3. 672
648

4. 3 × 3;
4 × 11;
7 × 5.

THIRD QUARTER.

1. 506
78
951
7
284

2. 207
109

3. 345
56

4. 4 × 9;
8 × 5;
6 × 12.

STANDARD II.—FIRST QUARTER.

1. 4,019 + 706 + 5 + 30,680 + 92 + 15,015.

2. Take 59,987 from 60,016.

3. 73,618 × 67.

4. 37d.; 56d.; 71d.

SECOND QUARTER.

1. 30,468 ÷ 6. Write the answer in words.

2. 95,704 × 308.

3. An orchard has 46 rows of trees, 7 in a row, and 37 rows of trees, 9 in a row. How many trees are there in the orchard?

4. 93d.; 102d.; 117d.

THIRD QUARTER.

1. 64,973 × 9,400.

2. 55,776 ÷ 7.

3. How many nails will it take to shoe 359 horses, if each shoe require eight nails?

4. 128d.; 135d.; 141d.

STANDARD III.—FIRST QUARTER.

1. Divide four hundred and nine thousand three hundred and ten by seventy-nine.

2. How many times is 407 contained in 398,860?

3. What number divided by 139 brings the quotient 139 and 79 remainder?

4. Find the quotient of 728,852 and 2,836.

SECOND QUARTER.

1. Take 7¼d. from ten thousand pounds.

2. £7 19s. 8½d. + £50 6s. 10¼d. + 6½d. + £201,904 17s. 9¾d. + £8 13s. 11¼d. + £3,058,006 18s. + £7,020 15s. 3d.

3. A boy exchanged 406 marbles for some nuts, and for every seven marbles he got three nuts. How many nuts did he get?

4. A man bought a coat for 28s., a vest for 12s. 6d., a pair of trousers for 19s. 6d., and a dozen collars at 6½d. each; what change had he out of a five pound note?

THIRD QUARTER.

1. Add sixty-nine pounds fifteen shillings and a farthing, twenty thousand and ten pounds nineteen shillings and eight pence halfpenny, ten pence farthing, seven hundred pounds and sixpence, two hundred and five thousand nine hundred and four pounds seventeen shillings and nine pence three farthings, three thousand and nine pounds fourteen shillings, and forty thousand four hundred pounds eleven shillings and eleven pence farthing.

2. Seven hundred and three thousand and seventy-three pounds sixteen shillings and five pence farthing minus seventy thousand three hundred and seven pounds sixteen shillings and seven pence three farthings.

3. A farmer bought 85 sheep for £165 15s.; how many shillings did each sheep cost?

4. From thirty guineas take thirteen half-guineas.

STANDARD IV.—FIRST QUARTER.

1. Multiply £915 10s. 8¼d. by 619.

2. From three hundred thousand pounds take nine thousand and ninety pounds fifteen shillings and a penny three farthings.

3. £7,086 9s. 5¾d. × 3,070.

4. Divide ten million ten thousand and ten pounds and ten pence by eight hundred and fifty.

SECOND QUARTER.

1. Reduce 143,054 inches to miles, &c.

2. If I had 70 guineas, how many men could I pay their wages at 24s. 6d. each?

3. 17 parcels, each weighing 19 stone, were made out of 6 tons 14 cwt. How many lbs. were left?

4. What will a man's wage amount to in a year (not reckoning Sundays) at 4s. 10d. per day?

THIRD QUARTER.

1. Find the price of a ton of coals when 288 tons cost £198.

2. If a foot of telegraph wire weigh 3 oz., what would half a mile weigh?

3. What is the cost of 739 gallons of milk at 2½d. per pint?

4. How many fields, each 3 a. 3 r. 33 po., can be made from an estate containing 130 a. 2 r. 9 po.

STANDARD V.—FIRST QUARTER.

1. Find the value of fifty thousand and ninety articles at 16s. 10¾d. each.

2. What is the cost of 19 tons 17 cwt. at £1 7s. 8¼d. per cwt.?

3. What is the amount for 26 days 10 hrs. 52 min. at 15s. a day?

4. Find the cost for 5 miles 6 fur. 8 po., charging 2d. a yard for wire, and £3 15s. a mile for the labour.

Second Quarter.

1. How long will it take 35 horses to eat some food which 65 horses can eat in 28 days?

2. If 3 ac. 3 ro. 30 po. produce a crop worth £51 3s. 9d., how much was that per acre?

3. Make an account for:—
340 herrings at 1s. 4d. per score;
54 oysters at 2s. 6d. per dozen;
3 dozen rabbits at 13d. each;
5½ dozen mackerel at 5½d. each.

4. What must be given for 17 acres 18 square poles of land at the rate of £109 10s. per acre?

Third Quarter.

1. Which is the greater and by how much—
$\frac{1}{3} + \frac{1}{7}$ or $\frac{1}{4} + \frac{1}{5}$?

2. Bill:—
17½ yards at 1s. 10d. per yard;
23 yards at 8½d. per yard;
19 blankets at 19s. 6d. per pair;
13 pairs of blankets at 15s. 9d. per pair;
40 towels at 11s. per dozen.

3. A boy filled $\frac{1}{3}$ of a book on Monday, $\frac{1}{6}$ on Tuesday, and $\frac{2}{7}$ on Wednesday. How much was there left?

4. If a train travel 40 miles an hour, how many yards does it go in a second?

Standard VI.—First Quarter.

1. Add 15 eighths, 17 ninths, 13 sevenths, and 19 fifths.

2. What is the L. C. M. of the numbers from 2 to 12?

3. (7·5496 × ·00385) ÷ 10,000.

4. Divide $\frac{\frac{3}{7} - \frac{2}{5}}{\frac{3}{7} + \frac{2}{5}}$ by $\frac{5\frac{1}{3}}{5 - \frac{1}{3}}$.

Second Quarter.

1. Find the value of 794½ articles at £1 15s. 8½d. each.

2. Reduce 5$\frac{5}{6}$d. to the decimal of 13s. 9d.

3. Find the sum of 7$\frac{5}{9}$ and 9$\frac{7}{11}$, and subtract it from 17·57.

4. If a snail crawl 4$\frac{1}{8}$ inches in 2$\frac{1}{3}$ minutes, how long will it take to crawl three quarters of a yard?

Third Quarter.

1. What is the interest on £3,597 16s. 8d. at 3 per cent. for half a year?

2. From $\frac{3}{5}$ of $\frac{4}{9}$ of 10 guineas take $\frac{7}{8}$ of 1$\frac{1}{2}$ of £2.

3. To what sum will £495 amount in 2$\frac{3}{4}$ years at 4$\frac{1}{4}$ per cent.?

4. Take the least from the greatest of ·798̇, ·798̇, and ·798̇.

Standard VII.—First Quarter.

1. A, B, and C can do a piece of work in 8 days. B can do it in 24 days, and C in 20 days. In what time can A do it?

2. I travelled 247½ miles in 8½ days of 8$\frac{1}{3}$ hours each. What distance can I go at the same rate in 10 days of 9 hours each?

3. At what rate per cent. will £351 5s. amount to £435 11s. in 6 years?

4. If 18 men work 8 days of 9 hours each for £22 10s., how many hours per day must 24 men work to obtain £30 in 6 days.

Second Quarter.

1. What principal will gain £60 2s. 3d. in 3½ years at 3 per cent.?

2. Find the average of all the numbers ending in seven from 1 to 100.

3. Divide the sum of 5·3̇8̇ and 5·38̇ by their difference.

4. Ten suits of clothes contain an average of 4½ yards; 4 of them have 4$\frac{3}{8}$ yards each, and 5 of them 4¼ yards each; what does the remaining suit contain?

Third Quarter.

1. If 1s. 9d. be gained on 9 yards of flannel at 10½d. per yard, what is the gain per cent.?

2. What number increased 40 per cent. amounts to 264$\frac{3}{8}$?

3. Three fields are purchased for £490, £768, and £2,186; they contain 3 a. 3 r. 25 po., 5 a. 1 r. 30 po., and 8 a. 2 r. 15 po. What is the average cost of all per acre?

4. By selling a watch for £7 1s., 6 per cent. was lost; what should it have been sold for to gain 12 per cent.?

ANSWERS.

Standard I.

	First.	Second.	Third.
1.	872.	1,569.	1,826.
2.	542.	782.	98.
3.	371.	34.	289.
4.	20; 24; 20.	9; 44; 35.	36; 40; 72.

Standard II.

	First.	Second.
1.	50,517.	5,078.
2.	29.	29,476,832.
3.	4,932,406.	655 trees.
4.	3s. 1d.; 4s. 8d.; 5s. 11d.	7s. 9d.; 8s. 6d.; 9s. 9d.

Third.

1. 610,746,200.
2. 7,968.
3. 11,488 nails.
4. 10s. 8d.; 11s. 3d.; 11s. 9d.

Standard III.

	First.	Second.	Third.
1.	5,181 + 11.	£9,999 19s. 4$\frac{3}{4}$d.	£270,095 19s. 10d.
2.	980 times.	£3,266,999 12s. 1¼d.	£632,765 19s. 9½d.
3.	19,400.	174 nuts.	39 shillings.
4.	257.	£1 13s. 6d.	£24 13s. 6d.

STANDARD IV.

	FIRST.	SECOND.
1.	£566,715 15s. 6¾d.	2mls. 2fur. 2po. 2yds. 2ft. 2in.
2.	£290,909 4s. 10¾d.	60 men.
3.	£21,755,475 1s. 0¾d.	10,486 lbs.
4.	£11,776 9s. 7¾d. + 90 q.	£75 12s. 10d.

THIRD.

1. 13s. 9d.
2. 7,920 oz., or 4 cwt. 1 qr. 19 lbs.
3. £61 11s. 8d.
4. 33 fields.

STANDARD V.—FIRST.

1. £42,315 12s. 3½d.
2. £549 11s. 11¼d.
3. £19 16s. 9½d.
4. £106 7s. 1½d.

SECOND.

1. 52 days.
2. £13.
3. £1 2s. 8d. + 11s. 3d. + £1 19s. + £1 10s. 3d. = £5 3s. 2d.
4. £1,873 16s. 4½d.

THIRD.

1. ¼ + ⅛ by $\frac{37}{100}$.
2. £1 12s. 1d. + 16s. 3½d. + £9 5s. 3d. + £10 4s. 9d. + £1 16s. 8d. = £23 15s. 0¾d.
3. $\frac{77}{216}$.
4. 19⅝ yards.

STANDARD VI.

	FIRST.	SECOND.	THIRD.
1.	9$\frac{1}{2}\frac{2}{3}\frac{3}{4}$.	£1,419 10s. 1¾d.	£53 19s. 4½d.
2.	27,720.	·035.	£1 3s. 11d.
3.	·000002906596.	·38.	£552 17s. 0⅜d.
4.	$\frac{7}{12}$.	15 minutes.	·0001911 or $\frac{7}{3\,6\,6}$.

STANDARD VII.

	FIRST.	SECOND.	THIRD.
1.	30 days.	£572 10s.	28⅔ per cent.
2.	324 miles.	52.	189.
3.	4 per cent.	2,133.	£192.
4.	12 hours.	5¼ yards.	£8 8s.

Model Essays for Pupil Teachers.

BY C. J. DAWSON, B.A.,

Ex-President of the N.U.E.T.

VII.

THE specimen essay which we gave last month for the benefit of our students was of a practical kind, and its subject was one which must prove specially interesting to those engaged in the work of teaching. We refer to it now for the purpose of pressing home the hint that, where it is possible, subjects for essays should be treated in a practical manner.

Amongst our homely proverbs are many which afford excellent opportunity for such practical treatment in the form of explanatory amplification and instructive illustration. Some popular sayings, indeed, express moral truth in a subtle or poetical fashion, and thus invite an argumentative style in unravelling and illustrating their meaning. But others are eminently plain and practical, and can best be treated by stating and grouping facts which are learnt by observation and experience, and serve to explain and exemplify the teaching embodied in the sayings.

As a sample of this particular kind of subject and its treatment we propose to place before our readers this month an essay on the practical proverb—

FIRE IS A GOOD SERVANT BUT A BAD MASTER.

It is hardly possible to over-estimate the importance of a proper understanding and appreciation of the familiar saying, "Fire is a good servant but a bad master." It is easy to express its meaning in other words. It means that fire is of great use to us as long as it is under control, but it does great mischief when it passes beyond control.

Fire may be defined as the manifestation of chemical changes in substances subject to great heat. As long as heat and the chemical changes produced by it can be governed useful results may be secured, but when this heat and its consequences go on extending to fresh materials, and become independent of human direction, the result may be great danger and destruction of property and of life.

In considering the manifold uses of fire we can hardly help recalling the fact that man has been defined as the only animal that makes a fire. The natural method of kindling a fire as practised by savages is that of rubbing together two pieces of dry wood. It has been adopted by travellers and other civilised people when dependent on the simplest operations for the preparation of their food. Other natural means of producing great heat and kindling fire for the service of man have been discovered, as the striking of flint or other hard stone against steel, and the use of a convex glass in condensing the sun's rays. Such plans have not only been serviceable in assisting man to prepare his food, but have also led to many useful inventions and discoveries.

It would take long to enumerate the various kinds of service which fire is made to render. If cookery was its first application, its use was early extended to the working of metals and simple manufactures; and, in later times, through the discovery of the power of steam, fire has become serviceable in assisting different modes of locomotion, and increasing man's power in almost every form of manufacture. Brewing, the distillation of spirits and essences, the making of gas from coal, the making of soaps and other chemical products, are in large measure dependent on the application of heat.

Consider how fire is kept in a state of control. Fire-places, grates, furnaces, or braziers are constructed to limit the extent of its heat. Air currents to fan the flames are carefully directed and kept subject to necessary checks, as by means of dampers. These are some of the ways in which fire is made the servant of man. Among other modes in which it is made serviceable we may name the means by which it can easily be produced where desired, as by the invention of lucifer matches, the storing of gas in reservoirs and its conveyance in pipes, the use of mineral and other oils for lighting and heating. Such facilities for making fire available for use involve additional risks if proportionate care be not taken to keep control over them.

This brings us to the question how fire may become our master. There are some forms of this danger which can scarcely be considered absolutely preventible. The lightning from the clouds may strike buildings or other collections of inflammable materials. Some

substances stored in close places generate heat by a form of fermentation, and take fire by what is called spontaneous combustion. And again, quickly moving parts of machinery may become over-heated by friction, and ignite inflammable substances in contact with them. It is possible, however, and usual to take precautions which may have the effect of reducing risks of this sort, and so prevent fire on many occasions from becoming the master. Thus, lofty buildings are usually furnished with long metal rods extending above their highest point, and leading down into the ground. The electricity which might be a source of danger is thus often carried down this conductor into the earth and made harmless. Materials likely to generate spontaneous combustion should be disturbed and ventilated at intervals; and machinery subject to great friction should be properly oiled before being put in motion, and afterwards cooled from time to time with water.

When fire gains the mastery over man it is most commonly through some act of carelessness, arising often from a want of thought as to the ease with which combustion may be caused, and the speed with which it may then pass beyond control. The careless use of matches, ignorant or random meddling with lamps for burning paraffin or petroleum, negligence of gas escaping from a pipe, or foolish search for the escape with a light, are among the frequent causes of destructive fires. Means have been devised for lessening the risks from such accidents as these; as for example, the invention of safety matches which will ignite only on a specially-prepared surface, and of lamps so constructed that the flame is extinguished by disturbing them. In referring to the careless use of matches we are reminded that a former Chancellor of the Exchequer proposed to place a small tax on lucifer matches, but was led to abandon it by an outcry against it as a tax on industry. It is possible, however, that such a tax, by causing greater care in this matter, might have done indirectly far more good in the prevention of fires than harm in diminishing the production of matches.

Sometimes (but we trust this is a comparatively rare occurrence) fires have been intentionally caused for the purposes of revenge or gain. This, which is called arson or incendiarism, is very properly regarded by the law as a criminal offence and subjects the offender, if convicted, to severe punishment. If we only think of the terrible consequences to innocent people which an action of this kind may involve, we cannot too strongly condemn its wickedness.

The cases are probably more frequent where fire gains the upper hand, and causes much loss and damage, through a kind of criminal carelessness; as when a thoughtless mother leaves helpless children within reach of fire, or when a foolish person under the bad influence of drink smokes his pipe in the midst of inflammable materials. Only a short time ago three little children were burnt to death in St. Pancras through the former of these causes.

It is the danger of fire becoming our master through acts of carelessness that makes it so important that the truth and full meaning of the common proverb should be impressed on the minds of children as well as adults. But when all is done that is possible in the way of instruction, and in the form of preventive contrivances, fire will continue on occasions through accident and want of human foresight to gain the mastery over human agency. It is then that means for regaining control become important. For this purpose many plans have been adopted. Most towns are supplied with a Fire Brigade, a band of men either paid officers or volunteers who undertake the task of putting out any fire that may occur in their district. They are provided with fire-engines and hose or pipes to throw a stream of water on the flaming materials. They have ladders and fire-escapes also to rescue if possible any persons who may be in the buildings on fire. To give them a chance of success in their task a good supply of water is necessary, and in every well-managed town care is taken that abundance of water shall be easily accessible for the extinction of fires.

In the beginning of a fire it is often possible to put it out and to save life by the use of smaller means, such as the fire extincteurs and hand grenades which have been devised for throwing on the flames a chemical composition which will not support combustion. A large and interesting collection of contrivances for preventing the destruction of life and property by fire was recently on view at the Fire-Rescue Exhibition in London; but of these the tale would be too long to tell here.

We ought not, however, to conclude this essay without some reference to Fire Insurance. This is a plan by which persons whose property may be accidentally burnt may yet guard themselves against absolute loss. By paying a small annual charge varying for different places according to the estimated risk of fire, one may secure in the event of accidental fire the payment from the funds of an Insurance Company of such a sum as may at least partly compensate for the damage done. This is a form of co-operative security to which every prudent householder should give attention. The establishment of such societies for defence against the tyrannical mastery of fire is one of the most practical lessons derived from the familiar proverb which forms our text.

(To be continued.)

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Practical Needlework in Elementary Schools.

BY MISS J. W. WARREN,

Inspectress of Needlework to the Leicester School Board.

As I have promised to keep close to the Government requirements in these papers, I shall, at the risk of repeating myself, remind my readers that, up to now, I have explained the work below Standard I. This belonging to an Infants' School proper, the drills I have written out, up to hemming inclusive, are for Infants. In a good school much more can be done than mere strip hemming, and should be attempted, but all coarser or finer material than that described should be avoided. Pocket handkerchiefs and plain towels may be hemmed, also pinafores. The 18 inch strips may be made into driving reins for the babies' rooms, or, when sewn together by the elder children, will serve for stays; in which case they should be lined with flannel or soft plain knitted cotton

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Fire may be defined as the manifestation of chemical changes in substances subject to great heat. As long as heat and the chemical changes produced by it can be governed useful results may be secured, but when this heat and its consequences go on extending to fresh materials, and become independent of human direction, the result may be great danger and destruction of property and of life.

In considering the manifold uses of fire we can hardly help recalling the fact that man has been defined as the only animal that makes a fire. The natural method of kindling a fire as practised by savages is that of rubbing together two pieces of dry wood. It has been adopted by travellers and other civilised people when dependent on the simplest operations for the preparation of their food. Other natural means of producing great heat and kindling fire for the service of man have been discovered, as the striking of flint or other hard stone against steel, and the use of a convex glass in condensing the sun's rays. Such plans have not only been serviceable in assisting man to prepare his food, but have also led to many useful inventions and discoveries.

It would take long to enumerate the various kinds of service which fire is made to render. If cookery was its first application, its use was early extended to the working of metals and simple manufactures; and, in later times, through the discovery of the power of steam, fire has become serviceable in assisting different modes of locomotion, and increasing man's power in almost every form of manufacture. Brewing, the distillation of spirits and essences, the making of gas from coal, the making of soaps and other chemical products, are in large measure dependent on the application of heat.

Consider how fire is kept in a state of control. Fire-places, grates, furnaces, or braziers are constructed to limit the extent of its heat. Air currents to fan the flames are carefully directed and kept subject to necessary checks, as by means of dampers. These are some of the ways in which fire is made the servant of man. Among other modes in which it is made serviceable we may name the means by which it can easily be produced where desired, as by the invention of lucifer matches, the storing of gas in reservoirs and its conveyance in pipes, the use of mineral and other oils for lighting and heating. Such facilities for making fire available for use involve additional risks if proportionate care be not taken to keep control over them.

This brings us to the question how fire may become our master. There are some forms of this danger which can scarcely be considered absolutely preventible. The lightning from the clouds may strike buildings or other collections of inflammable materials. Some

substances stored in close places generate heat by a form of fermentation, and take fire by what is called spontaneous combustion. And again, quickly moving parts of machinery may become over-heated by friction, and ignite inflammable substances in contact with them. It is possible, however, and usual to take precautions which may have the effect of reducing risks of this sort, and so prevent fire on many occasions from becoming the master. Thus, lofty buildings are usually furnished with long metal rods extending above their highest point, and leading down into the ground. The electricity which might be a source of danger is thus often carried down this conductor into the earth and made harmless. Materials likely to generate spontaneous combustion should be disturbed and ventilated at intervals; and machinery subject to great friction should be properly oiled before being put in motion, and afterwards cooled from time to time with water.

When fire gains the mastery over man it is most commonly through some act of carelessness, arising often from a want of thought as to the ease with which combustion may be caused, and the speed with which it may then pass beyond control. The careless use of matches, ignorant or random meddling with lamps for burning paraffin or petroleum, negligence of gas escaping from a pipe, or foolish search for the escape with a light, are among the frequent causes of destructive fires. Means have been devised for lessening the risks from such accidents as these; as for example, the invention of safety matches which will ignite only on a specially-prepared surface, and of lamps so constructed that the flame is extinguished by disturbing them. In referring to the careless use of matches we are reminded that a former Chancellor of the Exchequer proposed to place a small tax on lucifer matches, but was led to abandon it by an outcry against it as a tax on industry. It is possible, however, that such a tax, by causing greater care in this matter, might have done indirectly far more good in the prevention of fires than harm in diminishing the production of matches.

Sometimes (but we trust this is a comparatively rare occurrence) fires have been intentionally caused for the purposes of revenge or gain. This, which is called arson or incendiarism, is very properly regarded by the law as a criminal offence and subjects the offender, if convicted, to severe punishment. If we only think of the terrible consequences to innocent people which an action of this kind may involve, we cannot too strongly condemn its wickedness.

The cases are probably more frequent where fire gains the upper hand, and causes much loss and damage, through a kind of criminal carelessness; as when a thoughtless mother leaves helpless children within reach of fire, or when a foolish person under the bad influence of drink smokes his pipe in the midst of inflammable materials. Only a short time ago three little children were burnt to death in St. Pancras through the former of these causes.

It is the danger of fire becoming our master through acts of carelessness that makes it so important that the truth and full meaning of the common proverb should be impressed on the minds of children as well as adults. But when all is done that is possible in the way of instruction, and in the form of preventive contrivances, fire will continue on occasions through accident and want of human foresight to gain the mastery over human agency. It is then that means for regaining control become important. For this purpose many plans have been adopted. Most towns are supplied with a Fire Brigade, a band of men either paid officers or volunteers who undertake the task of putting out any fire that may occur in their district. They are provided with fire-engines and hose or pipes to throw a stream of water on the flaming materials. They have ladders and fire-escapes also to rescue if possible any persons who may be in the buildings on fire. To give them a chance of success in their task a good supply of water is necessary, and in every well-managed town care is taken that abundance of water shall be easily accessible for the extinction of fires.

In the beginning of a fire it is often possible to put it out and to save life by the use of smaller means, such as the fire extincteurs and hand grenades which have been devised for throwing on the flames a chemical composition which will not support combustion. A large and interesting collection of contrivances for preventing the destruction of life and property by fire was recently on view at the Fire-Rescue Exhibition in London; but of these the tale would be too long to tell here.

We ought not, however, to conclude this essay without some reference to Fire Insurance. This is a plan by which persons whose property may be accidentally burnt may yet guard themselves against absolute loss. By paying a small annual charge varying for different places according to the estimated risk of fire, one may secure in the event of accidental fire the payment from the funds of an Insurance Company of such a sum as may at least partly compensate for the damage done. This is a form of co-operative security to which every prudent householder should give attention. The establishment of such societies for defence against the tyrannical mastery of fire is one of the most practical lessons derived from the familiar proverb which forms our text.

(To be continued.)

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Practical Needlework in Elementary Schools.

BY MISS J. W. WARREN,

Inspectress of Needlework to the Leicester School Board.

As I have promised to keep close to the Government requirements in these papers, I shall, at the risk of repeating myself, remind my readers that, up to now, I have explained the work below Standard I. This belonging to an Infants' School proper, the drills I have written out, up to hemming inclusive, are for Infants. In a good school much more can be done than mere strip hemming, and should be attempted, but all coarser or finer material than that described should be avoided. Pocket handkerchiefs and plain towels may be hemmed, also pinafores. The 18 inch strips may be made into driving reins for the babies' rooms, or, when sewn together by the elder children, will serve for stays; in which case they should be lined with flannel or soft plain knitted cotton

strips. Directly the children in a class can do the running stitch with some success, their pieces should be retained and examined by Head Teacher in her monthly or bi-monthly examination. This plan serves two ends—one, to correct untidy work; the other, to encourage careful effort. The best should be given to each child for its home, when not wanted. The different drills, plans of progress and stepping stones with reference to needlework should be written up somewhere in the School so that teachers lose no time in learning the methods, but can at once follow the order of work, and thus aim at the general good. Unity of method is nowhere more necessary than in this all-important hand work, and it should go through each class, from the lowest to the highest. The most careful teachers should be chosen for the stitch, and other drills. If coloured cottons are used, then at least the two highest should be in each class, so that a proper grading may be effected. Time is saved by dividing a class into upper and lower divisions, giving the lower red, and the upper blue, cotton. The blue will probably work by themselves a few stitches while the teacher goes through the stitch orders in red.

The strips, &c., should never be fixed in class time. In some schools this is very general, but no other lesson is ever attempted in this way. Young teachers should remember that every moment spent with a pupil is wasted and lost to such, if not given up solely to teaching and instruction. The plan of preparing work while a child is 'going on,' is quite as absurd as it would be to take a Buffon to read when giving a lesson on the camel or antelope.

A plain sampler, of moderately fine Java canvas, on which the hemming stitch to standard size is worked, might be done by all the upper infants. The threads, of course, would be counted, and the regular slope of stitch ensured. As the Kindergarten so greatly aids needlework by the beauty of material, variety of work, and interest excited, there remains but little to be desired in the way of reform in needlework. We will now go on to consider the needs for a 1st Standard plan, which is but a very little advance upon previous work, and will occupy a very short space indeed.

In regard to the preparation of Infants for the annual Government Inspection, while being no blind worshipper of code Inspectors, I still think that they should be studied so far as to make the work as pleasant as possible. The little prepared strips should be within reach of each class so that no time be lost, and another important thing is that a different material be not given; this ridiculous plan is fatal to success. Plain hemming looks better on coarse light coloured holland than perhaps on any other material, and this should be used once a month, at least, if intended for examination. Girls' mistresses will often save their scraps if asked to do so. The needles and cottons should be the same as those used always, and in no case should children be hurried—no uneasy mind will obey ever such willing fingers; the nervous irritability will be worked out in fantastic stitches. I need scarcely add in concluding suggestions on this part of my papers that every class below the hemming classes should be prepared to go through the means of work by their drills, plays, songs, &c. None of this lower work will be despised by an examiner who understands his mission. A day now and then during the school year should be set apart for a visit from parents previously invited to see their children taught. More sympathy is sadly needed in this direction; besides, when they are helped to see the regularity and management needed for teaching needlework they will cease to complain that their children are not permitted to take miscellaneous articles from home to sew, patch, darn, and the like.

STANDARD I.—*Hemming, seaming, felling any garment or other useful article which can be completed by the above stitches*, e.g., *pinafore, pillow slip, or pocket handkerchief. In small, mixed, &c., &c.*

I then turn to revised instructions, and find that in the *hem* alone we must show a join. In this Standard are therefore given three new things to teach—seaming, felling, joining. Beginning on, and fastening off and fixing should certainly belong to this Standard too, but I will describe only those actually asked for.

PLAN.—Keep still for some months to the coarse brown calico suggested before; dispense (in hemming) with spots, stripes, or black cotton. Take, in place of black, a white or rose pink, so keeping three colours going. Change your cotton in size to *Nos. 40 or 50*, and use *sizes 7 or 8 in needles*, betweens or ground downs.

It will be well, too, if the calico is cut parallel with the selvege, as it keeps more smooth, and cut by thread, when time and stuff allow.

Cut your calico strips for general practice larger than those for specimens. Remember that we have to get in garments, and some training is necessary in order that children may deal with larger pieces satisfactorily. 14 by 4 will be found a good size for the plain hemming. These will admit of four joinings in the long sides, giving eight for practice in the whole strip. Each strip should be carefully fixed by the teachers with the ¼ inch hem, and will last about a month. The name of the child should be written in ink upon each strip.

The hem should first be taught for some few weeks independent of the join as it may chance that even the upper part of Standard I. are unfamiliar with your exact slope of stitch and method of work. They should do this with red cotton, and after working two or three inches the teacher should cut each needleful off about a half inch from the work. Let children well examine this thread; it comes out *above* the *hem-fold*. Now with the needle's point carefully lift this fold a little and find the cotton like a small bar running through; this can be caught by the needle's point and pulled through so as to come *under* the fold. The end is now ready for the new joining to be begun, the needle must now be threaded with blue cotton, the work on the finger exactly as for plain hem but the position of the needle to be just reversed, that is pointing over the hem fold to the *right*. Now slip the point under the hem and try to put it through the upper fold exactly *where the small end was* before you pulled it through; draw it carefully through towards the right and from you until the end is the same length as the end of red already lying under the fold. Both these ends must now with the needle be arranged pointing to the left, lying not under but just peeping *from under* the edge of fold, and each of the next six hem stitches must take them up in working. This is in simple matter of fact what has to be done, but it needs still further explanation if to be of any practical use.

SHEET III.

HEMMING DRILL. No. 7.	SEAMING DRILL. No. 8.	STITCHING DRILL. No. 9.
1. Take a piece at the bottom and top, needle pointing to left over top of hem. Push through to middle of needle.	1. Take a piece of each fold from the back; push needle to its middle, pointing direct to the chest.	1. Put needle in where cotton comes out and bring it 2, 3, or 4 threads (as directed).
2. Move right hand thumb and finger just over piece taken up.	2. Move thumb and finger to the front of this piece on needle. (Curve the hand.)	2. Move finger and thumb over to front as in other stitches.
3. With thimble push needle through right to its eye (still holding needle).	3. With thimble push needle through, guiding it with finger and thumb.	3. Push needle through a little further (not to eye).
4. Lift thimble, and pull needle through as far as cotton will go over left shoulder.	4. Draw needle through close to ear, right.	4. Draw it through, lifting thimble—direction as in hemming.
5. Arrange thimble and cotton again as in combination drill.	5. Arrange thimble again; cotton will be in place.	5. Place thimble and arrange cotton.
6. Place point of needle in position for another stitch.	6. Bring hand to front, and place needle for the other stitch.	6. Prepare needle for the next stitch.

NOTE.—Directions 2, 3, and 4 in all these drills will become one in course of time, but on no account allow this at first. Great attention should also be paid to the direction of cotton (4) in each drill; it will be seen that in Hemming and Seaming it differs. In Stitching, the needle should not be pushed as far as the eye, as the contact of thimble, &c., will tend to make the work dirty.

I have preferred to make the first order in each stitch drill *the actual making of stitch*. *Work placing* and *combination drills* would, of course, precede this order, but differ too much to be made apart, save as given in directions 5 and 6.

The left hand must in no case move except in the almost mechanical action required to bring fresh material under needle.

Tests in Mental Arithmetic.

STANDARD I.

1. Add together 9, 8, 7, and 6. 30.
2. Into how many fives can I place 30 books? 6.
3. Into how many tens can I put them? 3.
4. Four boys and three girls divided 42 nuts equally; how many did each child get? 6.
5. How many sixes are the same as eight threes? 4.
6. Take 4 times 12 from 60. 12.
7. What does 12 mean? Two and ten.
8. Give another name for 12. A dozen.
9. What is the cost of 3 dozen oranges at 4 a penny? 9d.
10. How many farthings are there in three pence halfpenny? 14.
11. What would 14 lemons cost at sixpence a dozen? 7d.
12. How many days are there in a month? 28.

STANDARD II.

1. Five girls took eight nuts each; how many were left out of half a hundred? 10.
2. How much would half a hundred cost at 20 a penny? 2½d.
3. How many dozen are there in 3 score? 5.
4. What is the half of 5 + 6 + 7? 9.
5. If 5 marbles cost a halfpenny, how many could you get for 9d.? 90.
6. What is the cost of 4 lbs. of sugar at 3½d. a pound? 1s. 2d.
7. What change would be received out of a florin? 10d.
8. How many florins are equal to 6 crowns? 15.
9. Three boys saved a crown; how much did each save, if they saved equally? 1s. 8d.
10. How many minutes are there in three quarters of an hour? 45.
11. If a quarter of a pound of tea cost 9d., how much is that per lb.? 3s.
12. If 1½ lbs. cost 3s., what does a lb. cost? 2s.

STANDARD III.

1. How many oranges must be cut up so that 50 children may have a half each? 25.
2. What is the half of the fourth part of a sovereign? 2s. 6d.
3. Find the cost of 4 score eggs at 10 for a shilling. 8s.
4. What is the value of 72 books at half-a-crown a dozen? 15s.
5. How much would 1¾ lbs. of mutton cost at 11d. a pound? 1s. 4½d.
6. What change would be received out of a double florin? 2s. 7½d.
7. If ¾ lb. of lamb cost 9d., how much would 2 lbs. cost? 2s.
8. If the railway fare for a journey is 3s. 6d., what is a fare and a half? 5s. 3d.
9. How many seconds are there in half an hour? 1,800.
10. A boy wastes ¼ hour a day; how much is that in 3 weeks? 5¼ hours.
11. How many lbs. are there in 3½ stone? 49.
12. How many half-ounces are there in 1½ lbs.? 48.

STANDARD IV.

1. What is the eighth part of a gross? 18.
2. Find the cost of 18 articles at 3s. 9d. a dozen. 5s. 7½d.
3. How much would a boy save in October, November, and December, if he save a penny a day? 7s. 8d.
4. How many more days must he save to have a sovereign? 148.
5. A man works 8 hours a day, and receives 7d. an hour; what are his week's wages? £1 8s.
6. If 6 nuts weigh an ounce, how many are there in 2½ lbs.? 240.
7. What would they cost at 1½d. for two dozen? 1s. 3d.
8. Find the value of 3 stone of potatoes at 2 lbs. for a penny. 1s. 9d.
9. What is the cost of an ounce of tea at 3s. 8d. per lb.? 2¾d.
10. If a gallon of beer cost 1s. 8d., what is the cost of a pint? 2½d.
11. How much would half a mile of ribbon cost at eight yards a penny? 9s. 2d.
12. How many pieces of board 3 inches long can be cut from a piece 2¼ yards in length? 27.

STANDARD V.

1. Find the difference between $\frac{4}{5}$ and $\frac{7}{10}$. $\frac{1}{10}$.
2. What is the sum of $\frac{4}{5}$ and $\frac{7}{10}$? $1\frac{1}{2}$.
3. After giving away a quarter of his marbles a boy had 15 left; how many had he at first? 20.
4. What is the smallest number of apples that can be arranged in fours, sixes, or eights? 24.
5. How much would a gross of books cost at 3½d. each? £2 2s.
6. A and B had 17s. between them, and A had 5s. myre than B; how much had B? 6s.
7. A square piece of board contains 25 square yards; how many feet long is a side? 15.
8. How much is five-thirds of a sovereign? £1 13s. 4d.
9. If 9 articles cost 3s. 9d., what would 17 cost? 7s. 1d.
10. What is the simple interest on £350 at 6 per cent. for 3 months? £5 5s.
11. Find 5 per cent. on £79 13s. 4d. £3 19s. 8d.
12. An article which cost 4s. was sold for 5s.; what was the gain per cent.? 25 per cent.

STANDARDS VI. AND VII.

1. If $\frac{4}{5}$ of the length of a room is 27 feet, what is the length of the room in yards? $11\frac{1}{4}$.
2. Take $1\frac{7}{12}$ from $3\frac{3}{8}$. $1\frac{19}{24}$.
3. Bring $\frac{5}{11}$ to a decimal. ·45.
4. Divide ·009 by ·3. ·03.
5. What must ·03 be multiplied by to make 30? 1,000.
6. If an article cost £7, what would ·85 of it cost? £5 19s.
7. What is the commission on £890 at $1\frac{1}{2}$ per cent.? £13 7s.
8. Find the simple interest on £30 for 3 years at 3 per cent. £2 14s.
9. What is the interest on £650 for 219 days at 4 per cent.? £15 12s.
10. Reduce $\frac{5}{8}$ of a shilling to the decimal of half-a-crown. ·25.
11. A shopkeeper sold a hat for 7s. 6d., and lost 25 per cent.; how much did it cost? 10s.
12. If it had been sold for 7s., what would have been the loss per cent.? 30.

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Model Answers to Certificate Questions, Christmas, 1887.

Male and Female Candidates.

SECOND YEAR.

Latin.

Male Candidates may answer questions in *two* Languages; *Female* Candidates in *one* only.

TWO *hours allowed for this Paper for Male Candidates;* THREE *hours for Female Candidates.*

SECTION I.

1. Translate into English:—

(*a*) Anno ante me censorem mortuus est, novem annis post meum consulatum, quum consul iterum, me consule, creatus esset. Num igitur, si ad centesimum annum *vixisset*, senectutis eum suæ pœniteret? Nec enim excursione, nec saltu, nec eminus hastis aut cominus *gladiis* uteretur, sed consilio, ratione, sententia. Quæ nisi essent in senibus, non summum consilium majores nostri appellassent senatum.

(*b*) O præstans animi juvenis quantum ipse feroci
Virtute exsuperas, tanto me *impensius æquum est*
Consulere, atque omnes metuentem expendere casus,
Sunt tibi regna patris Dauni, sunt oppida capta
Multa manu; necnon aurumque animusque Latino est;
Sunt aliæ innuptæ Latio et Laurentibus agris,
Nec genus *indecores*. Sine me hæc haud mollia fatu
Sublatis aperire *dolis*; simul hæc animo hauri.

(*c*) Inclusas ut cum latebroso in pumice pastor
Vestigavit apes, fumoque implevit amaro,
Illæ intus trepidæ rerum per cerea castra
Discurrunt, magnisque acuunt stridoribus *iras*;
Volvitur ater odor tectis: tum murmure *cæco*
Intus saxa sonant: vacuas *it* fumus ad auras.

2. Parse the words printed in italics.

4. Decompose into their separate parts—*inclusas, respublica,* and trace the origin of *tragœdias, avidus, habilis.*

5. In what metre did Virgil write? How many feet are there in his lines? Of what kind are they? Scan the first three lines of extract (*c*), marking the quantities of each syllable.

(1) (*a*) He died the year before I was censor, nine years after my consulate, having been elected consul for the second time, when I held the same office. You do not think then that if he had lived to be a hundred, his age would have been a matter of regret to him? Instead of running, of leaping, of the thrust of the sword, the cast of the spear, he would have employed wisdom, reason, judgment. Unless these gifts resided in the old, our forefathers would not have named the supreme council the 'assembly of elders.'

(*b*) O gallant hearted youth, the more you abound in impetuous valour, the more behoves it that my prudence be untiring, that my caution weigh all possible issues. You have the kingdom of your father Daunus, and many a captured town, Latinus too has gold and a generous heart. Other maidens there are in Latium and the land of Laurentum, maidens not unworthy of you in birth. Suffer me to lay concealment aside and give plain utterance to these hard sayings, and be not deaf to this besides.

(*c*) As, when a shepherd has traced bees to their fastness in a cranny of the rock, and filled it with pungent smoke, the bees within rush in wild alarm about their wax built fortress, and whet their rage with loud buzzing. The black foul vapour rolls through their dwelling, then the hollow rock sounds with their stifled hum; the smoke escapes to the free air.

(2) *vixisset*—3rd sing., pluperf., subj., act., vivo, vivere, vixi, victum.
gladiis—abl. pl., *gladius*, masc., 2nd declens., gov. by *uteretur*.
impensius—comparat., neut., sing., used adverbially, from positive adv. *impense*, derived from the past participle pass. of *impendo*.
indecores—nom., fem., plural, from adj. *indecor* or *indecoris*.
Sublatis—abl., plur., mas., past participle, passive, from *tollo, sustuli, sublatum*, agreeing with *dolis* (ablat. absolute).
dolis—abl., plur., masc., from *dolus*, subst., 2nd decl.
Vestigavit—verb, act., perf., ind., 3rd sing. (subject *pastor*), *vestig-o, -are, -avi, -atum* (1st conjugation).
iras—acc., fem., pl., object of *acuunt* from *ira* (1st decl.)
Volvitur—verb, middle or passive, pres. ind., 3rd, sing. (subject *odor*), *volvo, volvere, volvi, volutum*.
cæco—adj., neut., sing., abl., agreeing with *murmure*.
it—verb, act., pres., indic., 3rd, sing. (subject *fumus*), *eo, ivi* (*ii*), *itum, ire*.

(4) *inclusas*, compounded from *in* and *clusas* (*clausus*) past part. pass. of *claudo*.
respublica, really two words *res* (subst.), *publica* (adj.)
tragœdia, a Greek word borrowed τραγῳδια from τράγος (goat) and ᾠδὴ (contracted for ἀοιδὴ from ἀείδω) a song, probably from an early custom of sacrificing a goat with singing of hymns in honour of Dionysus at the vintage feast; in these hymns the beginnings of Greek drama are to be sought.
avidus, from stem of *avere* (verb,) to desire: compare *avarus*.
habilis, from stem of *habere* (verb), to hold: that which can be held or handled readily, like English handy.

(5) Virgil wrote in hexameters, lines of six feet, either dactyls or spondees.

Īnclū|sās ūt |cūm lătē|brōsō ĭn |pūmĭcĕ |pāstŏr |
Vēstī|gāvīt ă|pēs, fū|mōquĕ ĭm|plēvīt ă|mārō |
Illæ ĭn|tūs trĕpi|dæ rĕ|rūm pĕr |cērĕă |cāstră |

Male and Female Candidates.

SECOND YEAR.

Latin.

SECTION II.

Translate into Latin:—

(*a*) He carried on war with the spirit of youth (as a young man) though plainly advanced in years.

(*b*) Plato died in his 81st year still composing (writing).

(*c*) But who am I, and what power do I possess?

(*d*) All things they care about, they remember.

(*e*) No one is so old as not to reckon he may live a year.

(*f*) The orator, I fear, may grow languid in old age; for his function is one not merely of intellect, but of lungs too, and strength.

(*a*) Hic bella gerebat ut adolescens, cum plane grandis esset.
(*b*) Plato uno et octogesimo anno scribens mortuus est.
(*c*) Sed quis ego, quidve possum?
(*d*) Omnia, quæ curant, meminerunt.
(*e*) Nemo est tam senex, qui se annum non putet posse vivere.
(*f*) Orator metuo ne languescat senectute. Est enim munus ejus non ingenii solum, sed laterum etiam et virium.

Male and Female Candidates.

SECOND YEAR.

Latin.

SECTION III.

1. Explain these expressions—Sapientissimus quisque: Sed quid opus est plura? Quorsus igitur hæc tam multa de Maximo? Senectutis eum suæ pœnitebit. Fenerari pecuniam.

2. What are deponent verbs? Give instances.

3. Distinguish the uses of *ita* and *tam*; *multum* and *diu* in the phrase 'cum multum diuque vixeris;' *opes* and *copiæ*.

4. '*Faciam ut potero.*' How should we render this in good English? '*Ut in homine Romano.*' How is *ut* used here?

5. Give the derivation of the following adjectives, and explain the full force of their terminations—*verax, tolerabilis, sanguineus, lacrimosus.*

Give two more instances of each class.

(1) *Sapientissimus quisque.*—'All wise men;' literally each wisest man.

Sed quid opus est plura?—'But why go on?' The original form of the expression is found in '*opus est gladio.*' 'There is work (to be done) with a sword;' *gladio* being an instrumental ablative. This being equivalent to saying 'A sword is necessary,' the true meaning of *opus* was forgotten, and the word treated as an indeclinable adjective with meaning of 'necessary.'

Quorsus hæc, etc.—'What is the object of this long discourse about Maximus? *Quorsus* is contracted for *quo-versus*, lit. 'Whither directed?' that is 'with what end in view?'

Senectutis, etc.—'He will regret that he has lived to be an old man,' the impersonal verb *pœnitet* is followed by a genitive of the object, and an accusative of the person feeling the emotion.

Fenerari pecuniam.—'To lend money at interest.' *Fenerari* is a deponent verb, formed from the substantive *fenus* (interest, usury), from *fe- feu-* (Greek φυ); compare *fe-tus, fe-cundus.* The notion that the interest is the *child* of the capital is seen also in the Greek word τόκος.

(2) Deponent verbs are really survivals of the middle voice in Latin, as *ulciscor*, I avenge myself; *vescor*, I feed myself.

(3) *Ita* is used in expressions of *manner*, *tam* in expressions of degree: *e.g. ita bonus est* means 'his goodness is shown in such a way;' *tam bonus est* 'his goodness is so great.'

Multum vivere means 'to live a great deal,' *i.e.* to live an active occupied life. *Diu vivere* means simply to live a long life.

Opes has its nearest parallel in English in the word 'means;' wealth or resources of any kind looked at as means to an end to be obtained. *Copiæ* rather corresponds to 'riches;' the emphasis being laid on the notion of 'abundance.' The two words are however of the same etymological origin, *cŏpia* being a contraction for co-ŏp-ia. *Copiæ* has also the special meaning of military forces, in which *opes* is not used.

(4) 'I will do what I can.'

Ut in homine Romano.—The *ut* here qualifies a verb implied, *e.g. fit*, and adduces a fact which must be allowed for in making the main statement. The literal meaning is 'in proportion to what (usually) happens in the case of a Roman.'

(5) *Verax.*—Stem *ver-*; the suffix *-ax*, of 'inclination,' 'propensity;' *cp. loqu-ax, pugn-ax.*

Tolerabilis.—Stem *tolera-*, extension of stem *tol-*, with the meaning of 'lift,' 'carry.' Suffix *-bilis*, of 'possibility;' *cp. lacrima-bilis, affa-bilis.*

Sanguineus.—Stem *sanguin-* 'blood.' Suffix *-eus* generally of the material of a thing; *cp. ferr-eus, aur-eus.*

Lacrimosus.—Stem *lacrim-* cp. Greek δακρυ-α. Suffix *-osus* meaning 'fullness,' *cp. verb-osus, animo-sus.*

Male Candidates.

FIRST YEAR.

Greek.

Male Candidates may answer questions in *two* Languages.
TWO *hours allowed for this Paper.*

SECTION I.

1. Translate into English:—

Πρὸς ταῦτα μετασάντες οἱ Ἕλληνες ἐβουλεύοντο καὶ ἀπεκρίναντο· Κλέαρχος δ' ἔλεγεν Ἡμεῖς οὔτε συνήλθομεν ὡς βασιλεῖ πολεμήσοντες, οὔτε ἐπορευόμεθα ἐπὶ βασιλέα· ἀλλὰ πολλὰς προφάσεις Κῦρος εὗρισκεν, ὡς καὶ σὺ εὖ οἶσθα, ἵνα ὑμᾶς τε ἀπαρασκευάστους λάβοι καὶ ἡμᾶς ἐνθάδε ἀναγάγοι. Ἐπεὶ μέντοι ἤδη ἐωρῶμεν αὐτὸν ἐν δεινῷ ὄντα, ᾐσχύνθημεν καὶ θεοὺς καὶ ἀνθρώπους προδοῦναι αὐτόν, ἐν τῷ πρόσθεν χρόνῳ παρέχοντες ἡμᾶς αὐτοὺς εὖ ποιεῖν. Ἐπεὶ δὲ Κῦρος τέθνηκεν, οὔτε βασιλεῖ ἀντιποιούμεθα τῆς ἀρχῆς, οὔτ' ἔστιν ὅτου ἕνεκα βουλοίμεθ' ἂν τὴν βασιλέως χώραν κακῶς ποιεῖν· οὐδ' αὐτὸν ἀποκτεῖναι ἂν ἐθέλοιμεν, πορευοίμεθα δ' ἂν οἴκαδε, εἴ τις ἡμᾶς μὴ λυποίη· ἀδικοῦντας μέντοι πειρασόμεθα σὺν τοῖς θεοῖς ἀμύνασθαι· ἐὰν μέντοι τις ἡμᾶς καὶ εὖ ποιῶν ὑπάρχῃ, καὶ τούτου εἰς γε δύναμιν οὐχ ἡττησόμεθα εὖ ποιοῦντες.

2. Parse **πολεμήσοντες, οἶσθα, ᾐσχύνθημεν, πρόσθεν, ἀρχῆς, ὅτου, ἀμύνασθαι.**

(1) Thereupon the Greeks held a consultation apart, and, Clearchus being their spokesman, made this reply: For our part, we neither assembled our force for war against the Persian king, nor was our march directed against him: but Cyrus, as you know as well as we, kept inventing fresh pretexts, that he might catch you unprepared, and bring us up the country to this place. When however we presently began to see the danger of his situation, we thought it shame before gods and men to desert him, we who previously offered ourselves to him for his service. But now that Cyrus is dead, we neither lay claim to any part of the king's dominion, nor have we any motive for injuring the king's territory; nay, we would not seek his life, but would march homeward, if we were safe from annoyance. Aggression on the other hand we will endeavour with the help of heaven to repel: whilst if anyone is kind enough to render us any service, we will repay the obligation in full measure, as far as our ability allows.

(2)

πολεμήσοντες.	fut. part, act., from **πολεμέω**, nom., pl., mas.
οἶσθα.	2nd, sing., indic. of **οἶδα**, a perfect form from stem **ἰδ**.
ᾐσχύνθημεν.	1st, plur., 1st aor., indic., passive from **αἰσχύνω**.
πρόσθεν.	Adverb of time.
ἀρχῆς.	Gen., sing., fem., 1st decl. from **ἀρχὴ**.
ὅτου.	Gen., sing., neut., relative pronoun from an older form of **ὅστις**.
ἀμύνασθαι.	1st aor., inf., middle, from **ἀμύνω**.

SECTION II.

Translate into Greek:—

(*a.*) A certain man had two daughters and three sons.

(*b.*) I am also of that opinion.

(*c.*) On the following day he said nothing; but on the third he spoke.

(*d*.) Tissaphernes will break down the bridge in the course of the night.

(*e*.) I am the man whom you seek.

(*f*.) As the sun was setting, he called together the Generals of the Greeks.

(*a*) εἶχέ τις δύο θυγατέρας καὶ τρεῖς υἱούς.

(*b*) ὅκεῖ κἀμοὶ ταῦτα.

(*c*) τῇ μὲν ὑστεραίᾳ ὑνδὲν ἔλεγεν· τῇ δὲ τρίτῃ εἶπεν.

(*d*) ὁ Τισσαφερνης τὴν γέφυραν τῆς νυκτὸς λύσει.

(*e*) αὐτός εἰμι ὃν ζητεῖς.

(*f*) ἡλίου δύνοντος συνεκάλεσε τοὺς τῶν Ἑλλήνων στρατηγούς.

Section III.

1. Name any exceptions to the general rule that nouns in -ος not increasing in the genitive are masculine. Decline διώρυξ, ἄναξ, γυνή.

2. Give the future, aorist, and perfect of βαίνω, γιγνώσκω, ἔρχομαι, θνήσκω. Give the 1st and 2nd aorists of ἵστημι, and τίθημι, and state the difference in the usage of them.

3. Name four derivatives from στρατός, and explain accurately how they are formed.

4. Give instances of adverbs used with the article, and state the meanings. How should you translate το ἡδύ, το καλόν, τὸ κακόν.

5. Give the comparatives and superlatives of μέγας, μικρός, μάλα, πολύ, κακῶς.

6. Relate the circumstances of the death of Clearchus: and state two reasons for supposing that Proxenus the Bœotian was a personal friend of the author.

(1) ὁδός, κέλευθος, νῆσος, νόσος, are all feminine; so too names of towns, as Κόρινθος.

	Sing.	Plur.	Dual
N. and V.	δίωρυξ	διώρυχες	διώρυχε
Acc.	διώρυχα	διώρυχας	διώρυχε
Gen.	διώρυχος	διωρύχων	διωρύχοιν
Dat.	διώρυχα	διώρυξι	διωρύχοιν

	Sing.	Plur.	Dual
N.	ἄναξ	ἄνακτες	ἄνακτε
V.	ἄναξ or ἄνα	ἄνακτες	ἄνακτε
Acc.	ἄνακτα	ἄνακτας	ἄνακτε
Gen.	ἄνακτος	ἀνάκτων	ἀνάκτοιν
Dat.	ἄνακτι	ἄναξι	ἀνάκτοιν

	Sing.	Plur.	Dual
N.	γυνὴ	γυναῖκες	γυναῖκε
V.	γύναι	γυναῖκες	γυναῖκε
Acc.	γυναῖκα	γυναῖκας	γυναῖκε
Gen.	γυναικὸς	γυναικῶν	γυναικοῖν
Dat.	γυναικὶ	γυναιξι	γυναικοῖν

(2)

Present	future	aorist.	perfect
βαίνω	βήσω (trans.)	ἔβησα (trans.)	βέβηκα.
	βήσομαι (intrans.)	ἔβην (intrans.)	
γιγνώσκω	γνώσομαι	ἔγνων	ἔγνωκα.
ἔρχομαι	ἐλεύσομαι	ἦλθον	ἐλήλυθα.
θνήσκω	θανοῦμαι	ἔθανον	τέθνηκα.

ἵστημι 1st aor. ἔστησα, transitive, 'I placed.'
2nd aor. ἔστην, intransitive, 'I stood.'
τίθημι 1st aor. ἔθηκα, transitive, rarely used except in the singular.
2nd aor. ἔθην, transitive, rarely used in the singular.

(3) στρατηγὸς from the stems στρατ- and ηγ- combined; the ο is a stem-suffix, the ς the inflexional suffix for the nominative case.
στρατιώτης from stem στρατ- by addition of termination -ιωτ expressing agency: the η is the stem-suffix; the ς the nominative inflexional suffix.
στρατία from stem στρατ- by addition of termination -ια (= ι + stem suffix α), with a collective or abstract force.
στρατηλάτης from stems στρατ- and ηλα- (lengthened from ἐλα- verb-stem of ἐλαύνω) combined with the termination -ητης (= τ + stem-suffix η + inflexional nominative suffix ς) expressing agency.

(4) οἱ νῦν = men of the present. τὰ ἐκεῖ = matters yonder.
οἱ πάνυ = men of rank or influence. τὸ μεταξὺ = the interval.
τὸ ἡδὺ = sweetness, delightfulness.
τὸ καλὸν = beauty; so, of moral beauty = goodness.
τὸ κακὸν = evil, mischief.

	Positive.	Comparative.	Superlative.
(5)	μεγας,	μέιζων,	μεγιστος.
	μικρὸς,	μικρότερος, μείων	μικρότατος, ἐλάχιστος
		ελάσσων,	
	μάλα,	μᾶλλον,	μάλιστα.
	πολὺ,	πλεῖον,	πλεῖστα.
	κακῶς,	κάκιον, χεῖρον,	κάκιστα, χείριστα

(6) The Greeks were on their way back to Ionia, under the treacherous guidance of Tissaphernes. Frequent disturbances took place, owing to the distrust felt towards each other by the Greeks and Persians. Clearchus tried to remedy their unsatisfactory relations by coming to a clear understanding with Tissaphernes. The latter met him with apparent frankness, and invited him to come the next day to his tent, with the other Greek generals and officers, promising to reveal then the names of the persons whose calumnies were the cause of this mutual distrust. Clearchus fell into the snare, and went to Tissaphernes with four other generals and twenty inferior officers. (λοχαγοί). The generals were admitted to the tent, the rest remained outstde. At a given signal the officers outside were overwhelmed and put to the sword; the generals were arrested, sent to the court of Persia, and shortly after beheaded.

(*a*) Xenophon, in the first chapter of Book III., says that Proxenus was an old friend of his (ξένος ὢν ἀρχαῖος); and it was on Proxenus' persuasion that Xenophon joined the army of Cyrus as a Volunteer.

(*b*) In chapter four of the Second Book we are told of an occurrence which happened to Xenophon and Proxenus, as they were taking a walk in front of the camp near Sittake, one evening after supper.

Notes of a Lesson on the arrangement of the Smaller Bodies of the Planetary System.

BY JOSEPH H. COWHAM, F.G.S.,

Master of Method: Westminster Training College.

INFORMATION TO BE TAUGHT.

A. Moons or Satellites.

1. **The Earth has one satellite which we call the moon.**

(*a*) The moon revolves round the earth at a distance of 238,000 miles **in a little less than 30 days.**

(*b*) It shines by reflected sunlight, and owing to the different positions it takes with respect to the Earth the illuminated portion presents a constantly changing appearance giving rise **to the Phases of the Moon.**

2. Jupiter has four satellites, each about as large as the moon.

(*a*) These move round the planet with great rapidity. Although the nearest satellite is nearly as far from Jupiter as our moon is from the Earth, **it rushes the entire distance round the planet in less than two of our days.**

(*b*) Jupiter and its four satellites act as a clock in the heavens, and sailors and other travellers are able to find Greenwich time in any part of the world, when one of the satellites is seen to pass behind the planet.

ILLUSTRATIONS AND TEACHING HINTS.

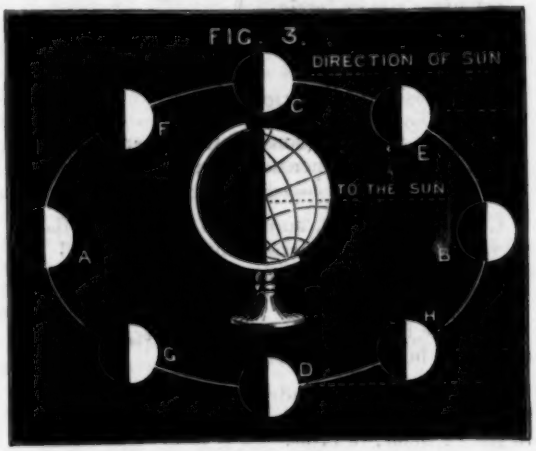


Fig. 1. Diagram illustrating the different positions occupied by the moon in one revolution round the Earth.

Refer again to the diagram above. The moon at the position marked A appears to be a full, bright orb, but at B no moon can be seen. If the moon were self-luminous, its appearance would be the same in both positions.

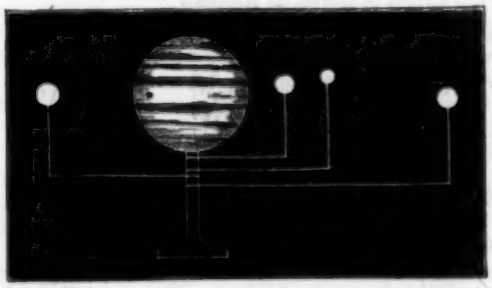


Fig. 2. Diagram of model used to illustrate the position and movements of the satellites of Jupiter.

(*a*) Contrast the movement of the moon round the Earth in 30 days with the much more rapid movement of the moons of Jupiter. The rapidity of movement will be further impressed by stating that the moon moves round our earth at above 2,000 miles per hour.

(*b*) Place a light in front of the model which represents Jupiter, then move one of the balls representing a satellite until it passes behind the planet. This will illustrate an eclipse. The children must be told that in the real eclipse of a satellite of Jupiter it can be seen to occur over nearly one half the Earth at the same time, *i.e.*, over that half from which the planet is visible.

3. Saturn has eight satellites only one of which is larger than our moon. Like the satellites of Jupiter these moons of Saturn move very rapidly round the planet.

(*a*) The nearest satellite is about one-third as far from Saturn as the moon is distant from the Earth, it moves the entire course round the planet **in less than one of our days.**

(*b*) The satellite furthest from Saturn is about nine times as far from its planet as the moon is distant from the Earth, **it travels over one revolution in about 2½ months.**

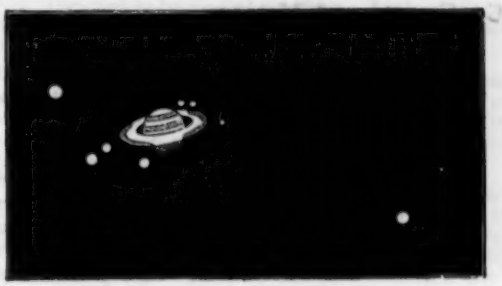


Fig. 3. Drawing to show the position of the eight satellites of Saturn.

(*a*) The great velocity of movement will be apparent if we state how rapidly the moon moves round our Earth.

(*b*) By means of this comparison the class should be impressed with the vast area over which Saturn and its system of moons extends, as well as with the rapidity of the movement of the satellites.

4. The most striking feature in connection with Saturn are the three rings of matter which surround the planet.

These rings are held by astronomers to be composed of an immense number of small bodies revolving round the planet with very great velocity.

The difference in the brightness of the rings is due to the particles in the innermost or *dark ring* being few and far apart, whilst in the outer and inner *bright rings* the particles are more numerous and much closer together.

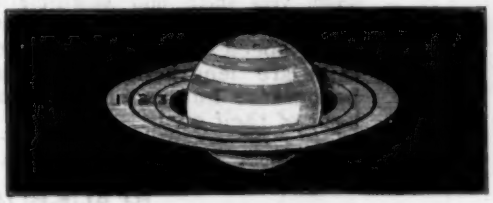


Fig. 4. Saturn and its rings.

3 represents the dark ring.
2 is the inner bright ring.
1 is the outer bright ring.

Lead the class first to the fact that each particle of ring material reflects sunlight. This may be illustrated by reference to the bright dust particles glittering in a beam of sunlight. The same example will also illustrate the fact that the more particles found in a given space, the greater will be the amount of light reflected.

B. Minor Planets or Planetoids.

Between the planets Mars and Jupiter there is a very great distance. In this space instead of one large planet being found as some of the old astronomers predicted, **there are very many small ones called Minor Planets or Planetoids.**

Fig. 5. In the above drawing the space between Mars and Jupiter is seen to be very great when compared with that between the Earth and Mars.

The dotted area represents the position within which most of the minor planets are found to move.

In 1845 only five of these tiny bodies had been discovered but since then additions have been made year by year until now there are known to be more than 250.

It is interesting to note that these bodies are constantly being discovered; when, however, the scholars are told that a telescope is needed to see them, they will infer their small size. They make up for their want of size by their number.

C. Comets and Meteors.

The remaining bodies which have a close connection with the planetary system are Comets and Meteors.

(*a*) Whilst planets keep nearly the same distance from the sun comets and meteors approach very near at times, and afterwards they remove to immense distances from the sun, and some never return.

(*b*) Planets reflect light, but meteors become self-luminous when, by reason of friction due to their rapid flight through the air, they blaze out and **form what we term shooting stars.**

(*c*) Comets change their appearance very much in different parts of their orbits. When they are far from the sun they seem very small and slowly-moving bodies, but when they approach the sun **their speed is quickened, their tails are lengthened, and they become so hot as to give some light of their own.**

Fig. 6. Comparison between the orbit of a planet and that of a comet E and a group of meteors F.

(*a*) A represents the orbit of a planet. B represents the orbit of a comet.

(*b*) The fact that planets reflect light is shown by the different phases which they manifest. The sudden blaze of a meteor is familiar to all, though the notion of falling stars may need correction. The development of heat by friction should be shown by actual experiment. A string passed rapidly through the closed hand, or simply rubbing the two hands together, will be effective illustrations.

(*c*) Illustrate these changes by a drawing such as Fig. 6. D represents a comet approaching the sun; E is the same comet near the sun. The reason of these changes must be left at present. The facts, however, as represented by the diagram, are interesting, and will be readily remembered.

BLACKBOARD SKETCH.

1. The small bodies which revolve round the different planets **are called Satellites.**
2. The Moon is the Earth's Satellite. It revolves in nearly 30 days. The changes in its appearance are termed **the phases of the Moon.**
3. Jupiter has four Satellites. They move very rapidly. By means of their eclipses **travellers in distant countries can tell Greenwich time.**
4. Saturn has eight Moons. They all move much more rapidly than our moon. Saturn has three rings—**the dark ring, the outer bright and inner bright rings.**
5. The Minor Planets are small bodies revolving round the Sun, chiefly in the space between Mars and Jupiter. **Some of these bodies are discovered every year.**
6. Comets and Meteors differ from Planets in the orbits they occupy, and in being self-luminous.

How to Teach School Children to Sing from Notes.

BY W. G. McNAUGHT,
Associate of The Royal Academy of Music.

DIVISION III.—STANDARDS III. AND IV.

Code Requirement.

Note Test.—(Modulator.) To sol-fa from the Examiner's pointing on the modulator, or from dictation, in any key, simple passages in the major diatonic scale, including **fe** and **ta** in stepwise progression, used thus:—**s fe s—d' ta l.**

Examples. Key C or D.

(1) **d r m s l s m f r s f m s d' t l s fe s f m s d' ta l s l t d' s m d.**

Key F or G.

(2) **d s, m r d t, d r m d ta, l, t, d r m s fe s f r d.**

Note Test.—(Written or printed.) To sol-fa at sight a written or printed exercise, including the notes of the Doh chord in any order, and any other notes of the major diatonic scale in stepwise succession.

Examples. Key C or D.

(1) **d d m r d m s f m s l s l t d'.**

Key F or G.

(2) **s m s d r m f m d t, d s, l, t, d s m r d.**

[The foregoing requirements and examples are quoted from a revised edition* of the Instructions as to Examination in Singing, recently issued by the Scotch Department. As the next edition to be issued by the English Department will probably follow the new Scotch copy,

* C 5442, price 2½d.

the wording and examples of the latter will be quoted in the remaining papers of this series. The alterations made are chiefly verbal, and the examples of tests are new: the tune tests from Division I. upwards, illustrating the use of the range

d to **d'** (tonic and octave)
and **s,** to **s** (dominant to dominant)

The necessity for special practice of the dominant range is mentioned in Section 10 (March number, p. 27), and the specimen tune tests hitherto given abundantly illustrate this tonal construction. The alterations for Divisions III. and IV. will be commented on as the various topics are considered.]

84. The modulator work must now include free leaps to and from *any* tone of the major diatonic scale (that is to say, the tones of the Doh, Soh and Fah chords). Most teachers will find it necessary to prepare their voluntaries, or at least to think over them beforehand. Otherwise they may find themselves pointing certain successions over and over again, or trying to avoid this fault by pointing ugly unmelodious successions that quickly cease to interest and instruct pupils. A little practice and careful observation will soon enable a teacher to make voluntaries that are fairly tuneful if they are not absolute tunes. Voluntaries need not always be rhythmic because if uncertain singers have fallen into the swing of a regular pulse they often feel impelled to sing a tone before they have properly preconceived it. But as skill increases it greatly adds to the interest of voluntaries if they have a rhythmic swing, that is, a regular pulse which a teacher can easily establish by designing to do so. Again, phrases that fairly balance one another can be shown by lifting the pointer where necessary. Quick movement from note to note is rarely practicable. Half pulses at the rate of about M. 70 can be followed, especially if they involve repetitions of a rhythmic shape already impressed upon the ear. In constructing such passages it is well to use stepwise movement or to repeat tones already struck.

Specimen Rhythmic Voluntary.

M. 60 or 70. Doh = E.

d :d | m .f :s	l :l | s :m	}	
m .r :d | m .r :d	r :r | m :—	}	
s :d' | d' .t :l	l :l | s .f :m	}	
r :r | m .f :s	s, :r | d :—		

Directly the swing of the pulse is established the pointer may anticipate the coming pulse without inconvenience.

It will be observed that the above specimen divides only the stronger pulses and that the rhythm TAA TAA TAATAI TAA comes again and again.

85. No matter how carefully voluntaries are prepared they soon cease to engage the interested attention of pupils if time after time they are sung in precisely the same way, namely, the whole class singing every note the teacher points. Innumerable ways of pitting one section of a class against another will occur to every thoughtful teacher. The interest and emulation evolved by little contests of skill assist the discipline and culture of a class in a surprising manner, and they enable an observant teacher to ascertain the abilities of individuals in the best possible way. In Section 29 several useful methods of varying practice were described. The following are other plans of practice :—

(1) The teacher announces he will point say four notes. The class to notice and recollect what was pointed, and then to sing them.

(2) The class to be divided into two, three, four or more sections. Each section to be responsible for one or more notes, and to sing only these as pointed.

(3) The class to be divided as above. Each section to sing a note in turn, *i.e.*, not look out for one particular tone, but for the one that falls to its turn.

86. Teachers should have some definite intention when pointing. The voluntaries should be designed (1) to practice some particular leap or difficulty, (2) to give fluency, (3) as tests similar to those likely to be applied by the Department.

87. The practice of sol-faaing may be easily overdone, the result being that pupils are incapable of singing at sight very simple passages to words or to the syllable *laa*. It is true that the Code does not require from any Division power to sing tests without sol-faaing. This fact, however, does not affect the more important fact that no really good results even in sol-faaing can be attained unless pupils are accustomed to think and sing without necessarily uttering the sol-fa names.

The utility of laaing in helping pupils to tell ear tests was shown in Sections 64 to 67. It is not, of course, that the syllable *laa* has any special virtue apart from the influence it may exert upon purity and sweetness of voice quality. Any other syllable or syllables that are not the sol-fa syllables will answer the purpose in view. In fact it is better for sight-singing purposes to vary the singing syllables from time to time. Thus the following exercises will be found to be instructive and amusing :—

(1) Follow pointing, using the names of the letters of the alphabet, A to Z, or the names of figures one to ten repeated as necessary.

(2) Follow pointing, using some well-known or easily remembered words over and over again until the end of the voluntary.

Example.

d	**m**	**s**	**l**	**s**	**m**	**r**	**m**	**f**	**s**	**l**	**s**
Sing sweet - ly			and clear - ly,			sing sweet - ly			and clear - ly.		
s	**d'**	**t**	**l**	**s**	**m**	**d**	**r**	**m**	**f**	**s**	**m**
Sing sweet - ly			and clear - ly,			sing sweet - ly			and clear - ly.		

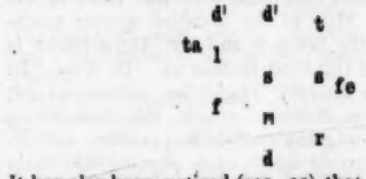
The name of a school or street, &c., will of course equally well answer the purpose.

(3) The teacher sings a short phrase to the sol-fa syllables, and the class replies, singing to laa or other syllables as directed.

(4) If difficult leaps are to be practised it will be best for the class to first sol-fa and then vocalise.

88. Abundant blackboard practice should be given in conjunction with the modulator work. An advantage of a written or printed exercise over a modulator exercise is that a pupil can see what is coming. The plans of interesting a class described in Sections 85 to 87 are of course equally available for blackboard exercises. It will be observed that the *written* note test, described in the requirements above, is only equivalent to the modulator test of the preceding Division, the leaps being confined to the doh chord. The tests given in Section 35 will therefore answer as specimens of written tests for this Division.

89. The tones *fe* and *ta*, the newest features of the note requirements, will be dealt with separately. The series of effects we call 'a key' has been shown to be the result of poising three similarly formed chords at certain distances or intervals from one another (see section 33). Thus the scale has been described as being derived from the tones of the Doh, Soh and Fah chords.



It has also been noticed (sec. 33) that iteration tends to make a Soh chord or a Fah chord sound like a new Doh

chord (a chord of repose) because the ear forgets the former Doh chord. It will be easily seen then that if the Soh chord is so ready to be regarded as a Doh chord the use of the tone **fe** will help the impression. Tnis is why the free use of **fe** (by leap to and from) practically changes the key, and as the sol-fa syllables in this connection are not attached to their accustomed mental effects, such a method of notation has to be employed with great discretion. All these facts are reproduced when **ta** is used. **ta** helps to make the Fah chord sound like a Doh chord because it provides what **te** could not, viz., a new **fah**. Leaps to and from **ta** therefore create difficulties for the reason given above. The code recognises the difficulties associated with **fe** and **ta** by expressly stipulating that only the easiest use of these tones will be tested. Thus, **fe** is to be always preceded and followed by **s** (**s fe s**) and **ta** is to be always preceded by **d'** above and followed by **l** below.

(To be continued.)

Science Notes.

PROFESSOR TILDEN'S address to the Chemical Section of the British Association contains some remarks which will interest teachers, and possibly irritate them too. He thinks that at the present time 'England is as well provided with places of instruction for the study of chemistry as any country in the world, and that a very large proportion of the heads of the chemical schools have shown by their own activity in research that they are qualified to give instruction of the highest kind. But plenty of colleges, competent teachers, and abundance of pupils have not produced what could reasonably have been expected in the way of original research, or even of accurate analytical work.' Of course not. Well appointed laboratories and eminent professors are very well, but so long as students have to pass examinations they will, if they are wise, work for them. The responsibility rests not with them, but very largely with the eminent professors themselves. 'I could point,' says the Professor, 'to prominent schools where the chemistry and other branches of science are taught by a peripatetic South Kensington teacher who arrives weekly with his box of tricks.' This is rather hard on the South Kensington teacher and the peripatetic system. The peripatetic system is, of course, only a temporary expedient. Without it, in the case mentioned, as in many others, chemistry would not be taught at all, or what might be almost as bad, taught without the help derived from the box of tricks which the Professor makes merry with. In time every large school will have its own teacher and its own box of tricks. Has the Professor himself never made use of a box of tricks? And then why should it be thought an impossible thing for a competent teacher to hail from South Kensington? The Professor must settle that point with the Dean of the Science School. Most of the so-called science teaching sustained by the Science and Art Department is done by people of this kind, he tells us. Be it so. In our opinion the country might be worse served. It appears to us that to attack the institutions which are doing a great work is inopportune and ill-advised. It is scarcely worth while arguing the main charge. To compare a South Kensington science teacher to a man who has ten minutes' start with the book will be recognised as nonsense at first sight by everybody, even by the Professor himself. Surely it is no more necessary that a man should be an accomplished chemist in order that he may teach the elements of chemistry than that a man should be an eminent mathematician before he can adequately explain the principles of arithmetic or a first rate artist before he can give suitable instruction in geometry and perspective. It is true a man cannot teach what he does not know, but it is equally true that only a few can teach effectively what they do know. Knowledge is only one of the qualifications of a competent teacher.

Meantime it would be a good thing if the professors could themselves agree as to the best methods of teaching, or else agree to leave the matter open. Only give teachers more liberty to teach what they think best, and in the way they find most effective, and there would soon be a marked improvement in the science teaching of the country. It matters little where you go, it is pretty much the same, nearly all the earnest vigorous work is done with the distinct view of passing some examination. Till that is changed it is vain to look for any great improvement.

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THE requirements for obtaining certificates to teach are raised somewhat. The possession of a degree no longer entitles its possessor to teach subjects not covered by his degree. Practically, the most important change is that relating to payment on two subjects only other than—(1) Practical Plane and Solid Geometry, and (5) Mathematics. Much can be said for the restriction to two science subjects. A lad with other subjects to learn cannot devote his attention profitably to more. One wonders that the step had not been taken before. But even now the restriction is only upon payment, not upon examination. A boy may still present himself for examination in a dozen science subjects, and be rewarded for it perhaps by obtaining a National Scholarship. Would it not be wise for the Department to go a little farther and make excellence in a few subjects, rather than mediocrity in many, the basis of distributing their rewards.

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IT must never be forgotten that the nation owes much to the Science and Art Department, much more than many critics are prepared to admit. Years before the present awaking to our deficiencies and requirements it was up and doing. Its teachers had often to create the desire for what they had to supply. They worked hard and successfully, but unfortunately they could not do it for nothing. It cannot be said that the Department ever asked or expected them to do so. We trust that no dread of Lord Randolph Churchill will lead the Science and Art Department to pare down their payments to such a point as will cease to make it worth the while of teachers in every part of the country to teach such classes as they can get together with zeal and satisfaction.

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THE New Directory for 1888—9 has been recently issued. As usual, the chief changes are printed in italic type. There are some important alterations and additions. A new elementary stage in general physics has been prepared, suggested, no doubt, by the new

elementary chemistry. Some preliminary acquaintance with the barest elements of chemistry and physics are felt to be indispensable in studying other branches of knowledge. It is gratifying that this has been recognised, and to some extent provided for. In all probability the new subject will become popular, both with teachers and pupils.

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SIR JAMES CRICHTON-BROWNE contributed an article to the August number of the *National Review*, on Hand-craft. His paper is well worth an attentive perusal. We do not share his apprehension that the withdrawal of scholars for two or three hours a week for manual instruction from the obligatory school work, while the requirements of examiners remain the same, could only lead to increased over-pressure. He says that the attempt to provide such workshops in Manchester has proved a failure, but he omits to state that there are not a few other instances in which such experiments have not proved a failure but a very conspicuous success. Sir James gives excellent reasons for conclusions to which many others had already come, that drawing and modelling should henceforward occupy a prominent part in all school programmes. 'Time,' he says, 'must be found for the thorough and methodical teaching of drawing, which in infant schools should occupy one half the time, and in elementary schools hold a much more prominent and honoured place than it has heretofore done. Drawing and modelling, it appears to me, offer the true universal training of the hand, the best exercise for developing the hand centres in the brain, and the most suitable introduction to the handicrafts which the great bulk of our people must follow for a living.' The enormous importance of the early introduction of hand training is based upon the physiological fact that recent research has proved that the most active period of the development of the hand centres of the brain extends from the fourth to the fifteenth year. Children whose hands have been left untrained up to the fifteenth year are practically incapable of high manual efficiency ever afterwards.

—o—

Jeanne d'Arc, by Lamartine.

JEANNE D'ARC.	JOAN OF ARC.
XX.	
Jeanne arriva à Chinon dans ces circonstances.	Joan arrived at Chinon under such circumstances.
On la logea dans le voisinage,	They lodged her in the neighbourhood,
au château du sire de Gaucourt.	in the castle of Gaucourt.
Visitée par les dames	Visited by the ladies
et par les seigneurs de la suite du roi,	and lords of the king's retinue,
sa simplicité ramena les uns,	Joan's simplicity (artlessness) dispelled the prejudices of some,
édifia les autres.	and strengthened the faith of others.
Les chevaliers qui tenaient pour le roi dans Orléans	The knights who were for the king in Orleans
avaient trop besoin d'un miracle	stood too much in need of a miracle
pour hésiter à croire à sa mission.	to hesitate to believe in her mission.
Ils envoyèrent quelques-uns des leurs	They sent some of their number
implorer et encourager leur future libératrice.	to call for and encourage their future deliverer (Saviour).
Le Dauphin, à leur instigation,	The Dauphin, at their instigation,
consentit enfin à la recevoir ;	at last consented to receive her ;
mais, dès le premier jour,	but, from the very first day,
il voulut l'éprouver.	he desired to prove (try, test) her.
L'humble paysanne de Domremy fut introduite,	The humble peasant of Domremy was introduced,
dans son costume de bergère,	in her shepherdess dress,
devant cette cour d'hommes d'armes,	before this court of men at arms,
de conseillers, de courtisans et de reines.	councillors, courtiers and queen.
Le Dauphin, vêtu	The Dauphin, clothed
avec une simplicité affectée	with affected simplicity,
et confondu dans les groupes	and mingling in the groups
de ses chevaliers richement armés,	of his knights richly armed
laissa à dessein la jeune fille	designedly left the young maiden
dans le doute sur celui d'entre tous	in doubt as to which of them
qui était son souverain.	was her sovereign.
'Si Dieu l'inspire véritablement,	'If God really inspires her,'
se dit-il,	said he to himself,
il la mènera à celui qui a seul	he will guide her to him who alone
dans ses veines le sang royal ;	has royal blood in his veins ;
si c'est le démon,	if the evil spirit inspires her,
il la mènera au plus apparent	he will guide her to the most likely one
d'entre mes hommes d'armes.'	among my knights.'
Jeanne s'avança en effet,	Joan in truth advanced,
confuse, éblouie, et comme indécise	confused, dazzled, and as if uncertain
entre cette foule,	among that crowd,
mais cherchant d'un regard timide,	but seeking with a timid look,
parmi tous, le seul vers lequel	among all, the only one to whom
elle était envoyée.	she was sent.
Elle le reconnut sans interroger personne ;	She recognised him without asking anyone ;
et se dirigeant modestement,	and going modestly,
mais sans hésitation, vers lui,	but without hesitation towards him (the Dauphin),
elle tomba à genoux	she fell on her knees
devant le jeune roi.	before the young king.
'Ce n'est pas moi qui suis le roi,	'It is not I who am the king,'
lui dit le prince, en cherchant	said the prince to her, while trying
à la jeter dans le doute.'	to make her doubt.
Mais Jeanne, que son cœur illuminait,	But Joan, whose heart inspired her with the truth,
insistant avec plus de force :	insisting with greater energy, said :
'Par mon Dieu, gentil prince,	'By Heaven, noble prince,
c'est vous, dit-elle, et non un autre !'	it is yourself and no other !'
Puis, d'une voix plus haute	Then, in a louder
et plus solennelle :	and more solemn voice :
'Très-noble Seigneur Dauphin !	'Most noble Dauphin !'
poursuivit Jeanne, le roi des cieux vous mande	continued Joan, 'the King of Heaven sends you word

par moi que vous serez sacré	by me that you will be consecrated
et couronné dans la ville de Reims,	and crowned in the town of Rheims,
et son lieutenant au royaume de France !'	and his lieutenant in the kingdom of France.'
A ce signe, la cours'émerveilla	At this sign, the court marvelled
et le Dauphin s'émut	and the Dauphin was deeply moved
d'admiration pour la belle fille.	with admiration for the beautiful maiden.
Toutefois il voulut un autre signe	However, he desired another sign
plus difficile et plus secret ;	(still) more difficult and secret ;
et, l'entrainant à l'écart de sa cour	and, drawing her away from his courtiers
dans une embrasure de fenêtre,	into the recess of a window,
il s'entretint à voix basse avec elle	he conversed with her in a low voice
sur un mystère de son âme	about a secret of his soul
qui travaillait sa conscience	which troubled (tormented) his conscience,
et qui lui inspirait secrètement des doutes	and which secretly inspired him with doubts
sur son droit au trône.	as to his right to the throne.
Ce mystère n'avait jamais été révélé	This secret had never been revealed
par lui à personne.	by him to anyone.
La réponse inspirée de Jeanne,	The inspired reply of Joan,
bien qu'elle ne fût pas entendue	although it was not heard
des assistants,	by those present,
répandit visiblement la sécurité	spread before all eyes a sense of security
et la joie sur le visage du Dauphin.	and joy over the Dauphin's countenance.
Souvent, et récemment encore,	Often, and again recently,
il s'était renfermé dans son oratoire,	he had shut himself up in his oratory,
priant Dieu avec larmes que,	beseeching the Almighty with tears, that
s'il était en effet le légitime héritier	if he were truly the lawful heir
du royaume, la Providence voulût	to the kingdom, Providence would
le lui confirmer et défendre	assure it to him and defend
son héritage pour lui, ou du moins	his heritage, or at least
lui éviter la mort et lui assurer asile	save him from death and secure him a refuge
parmi les Espagnols ou les Ecossais,	among the Spanish or Scotch,
ses seuls amis.	his only friends.
' Je te dis de la part de Dieu,	'I tell thee from God,'
lui répète Jeanne à voix plus haute	Joan repeated to him with a louder voice
et en le saluant,	as she saluted him,
que tu es vrai fils de roi	'that thou art the true son of a king
et héritier de la France !'	and the heir of France !'

Grammatical Notes, Questions, Sentences, and Pieces for Translatfon to Jeanne d'Arc.

CHAPTER XX.

Croire quelque chose, is to consider it true: croire *à* quelque chose, is, to have faith, confidence, trust in it: croire aux sorciers, is, to believe that there are such beings as sorcerers; croire les sorciers, is, to believe what sorcerers say: croire en Dieu, is, to believe in the existence of God. Dès = from; des = some; dès que = as soon as. *Le très* humble (is the *absolute* superlative); *le plus* humble (is the superlative of comparison).

Oral Teaching: The Preparation of Lessons and of Notes of Lessons.

BY JOSEPH H. COWHAM, F.G.S.,

Master of Method: Westminster Training College.

The Art of Questioning.

Seeing that questions form so valuable a feature in all oral instruction, it becomes of the first importance that a teacher should acquire and develop the art of questioning. There are many first class speakers who think clearly, and who can deliver a continuous discourse with great eloquence and ease, who, nevertheless fail entirely when they attempt to question a class of children. The reason of this is found in the fact that they have not received the necessary training. This training involves the fulfilment of three main conditions, viz.:—

(1) The power to think logically and to state clearly; (2) Good models of the art of questioning for imitation, and (3) Practice in the actual effort of teaching.

Other things being equal, those with wide information make the best teachers; at the same time there are others whose stock of knowledge is limited, but whose skill in questioning and in communicating obtained by imitation of good models and much practice, is such that they teach with much success. It is further important that a teacher should begin to embody his thoughts in interrogative expression early in life before other modes of speech have become set and habitual.

The following rules should be observed in forming questions. It should, however, be remembered that no amount of study of rules can make up for lack of practice under skilful direction:—

1. The language of a question should be simple and familiar.—The ability to come down to the level of the scholar's knowledge and to embody our thoughts in the language of the child is of great value to the teacher. A pupil cannot be expected to answer readily and successfully if there is any doubt in his mind as to the meaning of the several terms of a question, or if his thought is expended to any considerable extent in grasping the meaning of the question as a whole.

2. The question should be definite and free from ambiguity.—It is almost as fatal to good questioning that the scholar be in doubt upon the point of a question as that he fail to understand its terms. As an example of questioning which results in leaving the mind in doubt the following may be quoted.

A teacher was recently giving a lesson upon 'the seasons.' Holding a rotating globe in his hand, he said, 'You see these two pegs, one at either end; well the globe turns round upon the piece of wire joining them. Now, what is that piece of wire called which runs through the earth from pole to pole? *Answers:*—1. The telegraph. 2. The Earth's axis. The fault in the teacher's question in this example consisted in his confusing in its terms two distinct things, viz., the illustration with the thing illustrated.

When questions which are wanting in clearness of statement are frequently set, they result in the formation of a habit of guessing on the part of the children. Instead of being trained to expect one correct reply only the scholars cast about for probable answers and supply any that may possess the slightest association with the question.

Whenever the teacher receives, in answer to his questions, erroneous replies one after the other until at last some pupil either able to supply the deficiency in the question or fortunate in making a guess, gives the correct answer, and the teacher pleased to be thus rescued from a difficult position says 'Yes, that is just the answer I wanted,' it will almost invariably be found that the teacher did not get the answer he wanted at first because he did not ask properly for it.

3. When a question has been put in simple language, do not immediately proceed to amend it by introducing an additional fact or idea, or attempt to replace it by a second question entirely different:—

Questioning of the following kind is sometimes heard:—A distinction is being pointed out between the stems of grasses and those of trees; the children are to notice the fact that trees have strong and solid trunks and branches, whilst grasses have hollow and for the most part slender stems. After showing the stems of various grasses, and a section of the trunk, or of a large branch of a tree, the teacher wishes the children to state in their own words the difference they observe. Instead of taking the grasses, and after examining the hollow structure of the stem and representing its structure by a diagram on the board, then dealing in the same way with the structure of a section of the trunk of a tree—exaggerating somewhat the peculiarities of each—thus continuing and deepening the sense of difference first gained by direct observation, and finally asking the simple and direct question, What difference do you observe between the cut end of the grass and that of the tree trunk?—instead of proceeding in this thorough and straightforward way, the following unskilful method of questioning is sometimes followed: 'You see the cut end of this grass stem and of this tree trunk; tell me what difference you notice between them? You saw me cut across the stem of grass, and I want you to compare it with that of the tree trunk. What is the grass stem like?

In this example there are two distinct questions. The first was quite correct, and if it had been allowed to remain, it would have been most likely correctly answered; the teacher, however, thought that the comparison it demanded was probably in advance of his class, hence he proceeded to simplify his question, and instead of requiring a comparison between two objects before the class he asks for the results of their observation of only one. Some of the children will answer the first question, some of them the second, and all will be more or less bewildered.

4. Questions should be logically arranged.—It has already been frequently urged in these pages that questions should be used chiefly for the educational effect which they are calculated to produce. In order that they may stimulate to intellectual effort of the best kind they should be arranged so that if the series of questions and answers were taken down they would exhibit a clear and consecutive narrative. In order to secure this sequence a thorough preparation of the lesson is essential. Now, whilst it is of the highest importance that the teacher should prepare the order in which the several portions of his lesson must be taken, and picture to his mind the probable course the children will follow at certain difficult and critical stages of the lesson, it should be remembered that nothing is more likely to render his lesson disconnected in thought and dead in delivery than the preparation of the actual questions to be set during the giving of the lesson. These must of necessity be controlled by the nature of the answers the children give; and as these cannot with certainty be anticipated neither can the consequent questions be determined. Furthermore, the teacher is occupied in the effort of memory necessary to recall the precise form of the next question instead of his thought being concentrated upon the answers of his class and the state of mind these answers reveal. The best preparation is that of a thorough mastery of the entire subject, and a complete view of the leading features of the lesson in the order of teaching; then, having acquired a facility in framing questions, it will be found that these will proceed in a well ordered sequence. A limited divergence from the prepared plan may be permitted in order to give any explanations which the children's answers may suggest, taking care, however, to bring back the class with as little violence to consecutive thought as possible to the next step in the lesson.

5. Questions should demand a reasonable effort on the part of the scholar:—It is as necessary that we avoid questions which can be answered with little or no thought, as that we carefully abstain from setting questions which no previous teaching justifies.

If for example a class of children have been told that London stands on the Thames; London is then compared in size with Liverpool, Hull, and Newcastle respectively; they are further told that the Thames carries more shipping on its waters than any other English port; that the river supplies most of the inhabitants of London with water, and that it carries away their refuse. With these facts before them the following questions may very fairly be set.

1. Which is the most important of the following rivers:—the Humber, Thames, or Mersey?

2. Why is the Thames so important?

3. Why is the Thames more important than the Tyne.

The **first question** requires an exercise of *judgment* in order to decide upon the claim of the Thames to pre-eminent position.

The **second question** serves to exercise the *memory* in recalling and recounting the entire series of claims upon which the importance of the Thames is based.

The **third question** demands a comparison between the series of claims just enumerated, and those which a much smaller town and port would (*by inference*) invest the Tyne.

Whilst the questions stated above are thus seen to arise fairly out of the matter previously communicated, and at the same time to awaken and exercise simple and useful intellectual effort, the following questions are faulty.

1. Place the rivers mentioned in the order of their importance.

2. So we see that the Thames is the most important river. Is it not?

The **first question** requires a further statement of facts.

The **second question** can be answered without awakening any effort on the part of the class.

Answers to Questions.—Nothing manifests the tact and resource of a teacher more fully than the readiness and skill with which he deals with the answers to his questions. What is the meaning of the word 'grazing' in the sentence 'the horses were grazing in the field'? asked a teacher. 'Eating' answered a boy less anxious to be correct than to be first in reply. 'No,' said the teacher, passing to another child for a more correct answer. It was afterwards suggested to the teacher that the first boy's answer should have been utilised and not negatived. 'Yes, the horses were eating as you say; but suppose you saw the same horses feeding out of their nose-bags in the street, you could not say then that they were "grazing." Think a moment; you have just read about these horses grazing in a field. What would be their food? *Grass.* Now tell me what grazing means.

Children very rarely answer entirely without thought and, whilst we check the habit of guessing and all hasty and ill considered speech, we must take care not to discourage all effort on the part of our scholars by receiving as entirely wrong that which is in part correct.

The importance of insisting upon full answers to questions has already been urged. All broken and fragmentary utterances on the part of children must be discouraged, so that their answers may be of assistance to them in their efforts after careful thought and accurate expression.

To this intellectual result there may be added a disciplinary effect if only we receive our replies from as wide a class area as possible; for whilst answers are accepted from the brighter members of a class, who are thus encouraged to maintain their leading position, it is very necessary that the slower members should be stimulated to effort by frequent appeal. In this way the full advantage which emulation, working through the entire class, yields, may be secured.

(*To be continued.*)

How a Scotch School was Examined.

Infants.—Reading.—There were three classes who read from Blackie's 'Comprehensive Primers,' I. and II., and from Nelson's 'New Royal Reader,' 2nd Series. In first class all read, in lower classes each read till the Inspector said 'Next.'

Writing.—While one class read the others wrote the capitals *K*, *G*, *D*, *Y*, and small letters up to *h*.

Arithmetic.—All were arranged in gallery, and something like the following tests were given:—9 and 5? 7 and 8? 14 and 6? 10 and 7? 8 and 4? 9 and 7? 14 and 7? 11 and 8? 7 away from 9? 6 less than 15? 4 from 12? 5 from 7? 3 from 20? &c. A sheep has four legs, a hen two; how many legs altogether? How many legs have two cows and one calf?

Object Lesson.—Pupil teacher gave a lesson on the 'Ostrich.' Inspector did not interfere. Mistress gave a lesson on 'Colour.' A list of lessons on Animals, Manufactures, and Mining was submitted.

Music.—Scale of C. **d r d m d f d s d l d t d d'**. One action song was sung.

Schedule called the first day of examination and the infants were heard the second day.

STANDARD I.

Reading.—('New Royal Reader,' I., and 'Comprehensive Reader,' I.). All the pupils read—half from one book and half from the other, the slower ones being asked for two paragraphs.

Writing was taken from 'Comprehensive Reader,' and the pupils being numbered 1, 2, 3 all round, wrote a line corresponding to their numbers. Spelling was asked, and the meaning of simple phrases or of words.

Arithmetic.—This as usual given in words, the pupils being arranged so as to prevent copying:—

1. 402 + 900 + 390 + 401 + 60.
   2,153. Ans.
2. 948 + 785 + 989 + 786 + 845.
   4,353. Ans.
3. 409 — 125.
   284. Ans.

Music.—The teacher pointed a few intervals as **d f l s m r s t d'**, and then the children sang 'Pretty little Sunbeam.'

STANDARD II.

Reading.—(Blackie's 'Comprehensive Reader,' II., and 'New Royal Reader,' II.) All read, half a dozen from each book alternately round the class, a sentence, a paragraph, or more according to fluency.

Dictation.—Three lines were taken from the book used all the year, and were read in single words by the pupil teacher who had charge of the class. The slates were examined and then grouped into those having no errors, one error, two errors, &c. The results were noted by the Inspector.

The meaning of words and phrases asked, and the nouns were pointed out by some of the smarter fellows.

The copy-books were not looked at, but the penmanship on slates was minutely examined.

Music was taken along with the higher standards.

Arithmetic.—Read in words—pupils stood back-to-back.

1. 9,089 + 7,509, 8,700, 7,098, 9,860, 7,009.
   49,265. Ans.
2. 5,093,614 — 2,976,958 (*figures*).
   2,116,656. Ans.
3. 46,913,857 × 4 (*figures*).
   187,655,428. Ans.

STANDARD III.

Reading.—('Comprehensive Reader,' III., and Collins's 'Geographical and Historical Reader,' III.), The reading was taken from the first, the class standing seat by seat, and one paragraph taken from each.

The meaning of single words rather than phrases was asked.

Analysis.—The subject, predicate, and object were required to be selected from simple sentences chosen from the reading lesson, and the noun, verb and adjective asked to be pointed out by a pupil taken at random.

Dictation consisted of an easy five lines from 'Comprehensive Reader.'

Arithmetic.—Given from Cards, of which the following is a specimen:—

1. Divide seven hundred and thirty-one thousand six hundred and forty by six hundred and forty-nine.
   $1,127\frac{217}{649}$. Ans.

2. Multiply ninety-five thousand and eight by eight thousand and ninety-four.
   768,994,752. Ans.

3. Divide 218,421,616 by two hundred and seventy-three. 800,079$\frac{49}{273}$. Ans.

4. Find the sum of £31 0s. 7½d.; £49 16s. 5d.; 13s. 0½d.; £14 15s. 0½d.; and 19s. 2d.
£97 4s. 3½d. Ans.

Geography taken along with Standard IV., so far as concerns 'Scotland.' Questions were given on the islands on the west. What separates Islay from Jura? Jura from Cantyre? Cantyre from Arran? Mountains in Perth? Rivers in Inverness? Towns in Berwick? Capes in Ayrshire? Where is Ben More? Ben Nevis?

Standard IV. was then questioned on Ireland.

Recitation.—Each one repeated a verse of 'Lord Ullin's Daughter' and 'The Inchcape Bell.' The meanings of the principal words were asked.

STANDARD IV.

Reading.—('New Royal Reader,' No. IV., and 'Royal Scottish Reader,' No. IV.) The whole class read either a paragraph of prose or a verse of poetry from the 'Royal Reader.' The meaning of words and phrases from reading lessons.

Grammar and Analysis of simple sentences from any part of reading lesson; the word to be parsed being chosen by the examiner. About ten or eleven sentences in all were given to be analysed, and three or four of these sentences were parsed.

Geography.—See under Standard III.

History.—Charles I. and James II., genealogy and dates; battles of Civil War; causes of the war; military leaders; and then a few general questions.

Recitation.—'Wreck of the Hesperus,' a verse round the class, and then the meanings of words and phrases.

Music taken with V. and VI.

Arithmetic.—Four different Cards, of which the following is a sample:—

1. From £1,000 take £5 8s. 4d., and divide the result by 8. £124 6s. 5½d. Ans.

2. Multiply £643 12s. 5½d. by one hundred and thirty-seven. £88,176 3s. 11½d. Ans.

3. How many drams are in 3½ cwts.?
100,352 drams. Ans.

4. How much will a profit of £30,251 15s. 5d. gain to each of 25 shareholders?
£1,210 1s. 5d. Ans.

STANDARD V.

Reading.—('New Royal Reader' and 'Royal Scottish Reader,' No. V.) The reading was taken from the first, and the lesson chosen was 'Topsy,' from which the intelligence was tested.

Composition.—The story of Napoleon and the British sailor was told in the Inspector's own words, and the pupils required to reproduce it in the usual way.

Grammar and Analysis.—Sentences containing a principal clause and a subordinate one were selected from the reading lesson to be analysed, and the parsing of relative pronouns was a special feature of this part of the examination.

Arithmetic.—Three or four different Cards were distributed, of which the following is an average specimen:—

1. If 9 acres 3 roods 32 poles feed a flock of 25 sheep, how much will it take to feed a flock of 480 sheep? 191 ac. 0 ro. 6$\frac{2}{5}$ po. Ans.

2. Calculate by practice the value of 6,245 articles at £3 14s. 9d. each. £23,340 13s. 9d. Ans.

3. If 250 herrings go to a cran, and it takes 15 crans to fill a boat, what will be the cost of a boat load at 1½d. for 2? £11 14s. 4½d. Ans.

4. Simplify $(\frac{1}{7} - \frac{1}{8}) \div \frac{1}{3}$ of $\frac{1}{11}$. $5\frac{1}{2}$. Ans.

History.—American War of Independence; the '45; Questions on the effect of the Bill of Rights; the Act of Settlement, and the French Revolution.

Geography.—Rivers of Europe, source and mouth; Lakes of Italy; River of British Columbia; physical features of British America; towns (notes on them) of Australia.

Map-drawing was not professed, but the Inspector recommended special attention to this before his next visit.

Recitation.—'Horatius' (Macaulay), from which a few lines were repeated by each, and then meanings and allusions carefully gone over.

STANDARD VI.

Reading.—('New Royal' and 'Scottish Readers,' No. VI.) 'Trysting-tree' from Ivanhoe. Analysis and parsing from the same. Intelligence from reading-lesson, and this was pretty stiff for both Standard V. and VI.

Arithmetic.—A. (1) When corn was £2 per bushel, the 4 lb. loaf cost 6d. How much ought the 3 lb. loaf to cost when corn has fallen to 32s?
3$\frac{3}{4}$d. Ans.

2. Simplify $\frac{3\frac{1}{2} - 1\frac{7}{8}}{3\frac{1}{4} \times 2\frac{1}{2}} - \frac{1}{5}$ of $2\frac{3}{4}$. $-\frac{7}{20}$. Ans.

3. Express 1·6 of 4s. 2d. as the decimal of 18s. 6d.
·375. Ans.

4. Find the simple interest on £561 10s. for 73 days at 2$\frac{3}{4}$ per cent.? £3 1s. 9$\frac{9}{10}$d. Ans.

B. (1) Express in pints 3·645 pecks — ·09 qts. + ·0018 bushel. 58$\frac{310}{1250}$ pints. Ans.

2. In how many years will £1,000 become £1,213 6s. 8d. at 5½ per cent.? 3$\frac{28}{55}$. Ans.

3. If three men enter into partnership with a capital of £1,250, the first getting $\frac{3}{10}$ of the whole, and the second ½ of it, how much does the third enter with?
£625. Ans.

4. If 4 tons be carried 128 miles for £2 8s., how far ought 40 cwts. to be carried for 6s?
832 miles. Ans.

Geography.—Physical features of India; the rivers of United States; the countries of S. America; description of any one.

History.—The Corn Laws; the Chartists; the Crimean War; the various Afghan wars; and the Abyssinian War.

Recitation.—'The Saxon and the Gael,' a few lines from each, and the meanings of words and phrased.

Music.—Modulator, scale of C with removes to right and left, all the usual intervals with **d' ta l s fe s.** The following was handed to the teacher by the Inspector as a modulator exercise: doh me soh te doh' me ray te, doh soh ray me lah soh fe soh lah ray doh.

Staccato.

Sight-singing Test.—Key E.

m	:m	m	:m.s
s.f : f.m	f	:—	r	:r	r	:m.l	l.s : s.fe
s	:—	m	:m	m	:m.s	s.f : f.m	f	:—
r	:r	r	:m.r	r.d	:d.t,	d	:— ‖

Questions were asked on time, as to what constituted two-pulse, three-pulse, &c., and the different accents, as strong, medium, and weak. What were the signs for these?

Registers were tested as usual by taking names from the Schedules.

The sewing was carefully examined, and from the Infants to the Sixth Standard Schedule 3 was taken as a guide to test practical work.

—o—

My Drawing Examination and How it was Conducted.

BY A

HEAD TEACHER.

STANDARD I.

THE following were the Inspector's instructions:—

1. Divide slates into two equal parts.

2. Place a dot in the middle of that line.

3. Make another dot one quarter of an inch above that dot.

4. Through that dot draw a line three inches long, and parallel to the middle line.

5. Upon the line construct a square, using rulers and set-squares.

Each step was done by the teacher on the blackboard, and then by the scholars on their slates.

The Inspector left the class and returned in 12 minutes.

He then told the children to draw the same figure freehand, exactly under the top one, and the same size, the top line being as far below the middle line as the base of the top one was above it. The same time was allowed for this exercise.

Afterwards the teacher was requested to ask questions on the square and different angles.

The slates were then collected, and examined individually by the Inspector.

STANDARD II.

The exercise was the same as Standard I., but on paper.

The children were directed to divide the sides of the papers on which their names, &c., were not written into two equal parts, by measuring $5\frac{1}{2}$ inches on each side from the top, placing dots, and ruling lines across the papers.

The centre of the line had then to be found, and marked by a dot. Another point had then to be placed half an inch above it. This formed the centre of the base line of a square of 4 inches side. The square had then to be constructed with rulers and set-squares, the children following the teacher's example on the blackboard, line by line.

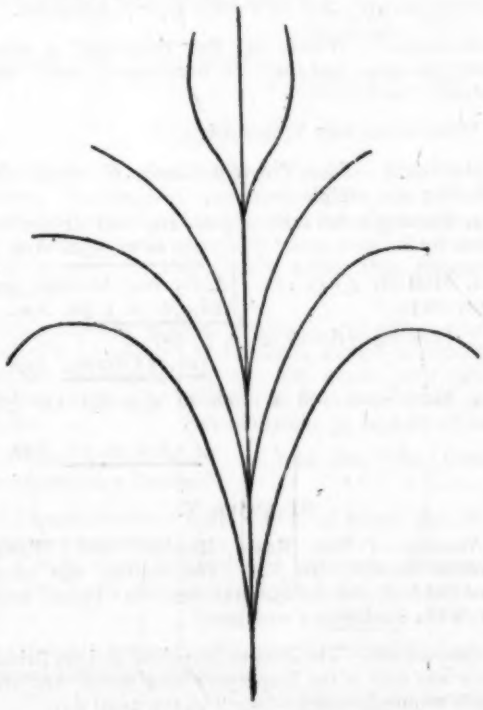
The second square had to be drawn freehand, the same size, and half an inch below the line.

The teacher was allowed to go round the class, and point out errors in the first square, but not in the second.

The Inspector afterwards questioned the class on the different angles, and called boys out to draw acute, obtuse, and right angles on the blackboard.

STANDARD III.

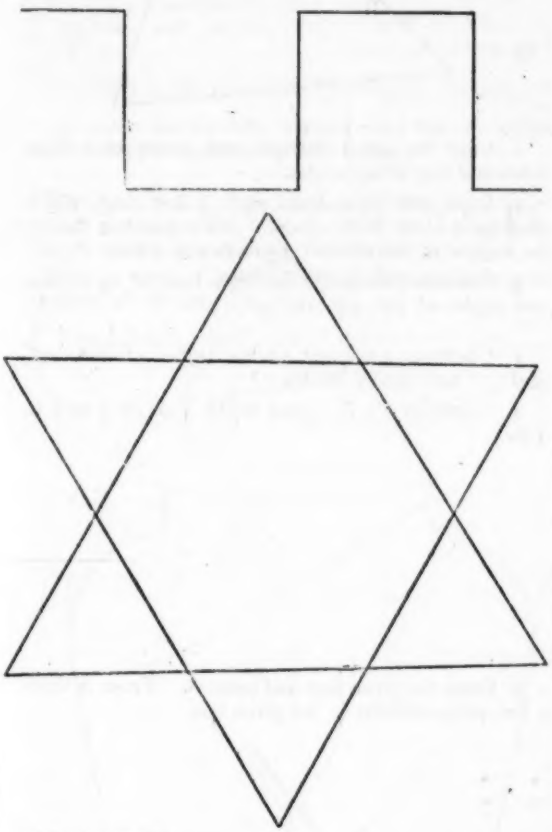
Half the class had the following freehand copy (which was pinned on the blackboard) to draw on the clear sides of their papers, marking off an inch from the top and bottom by dots, and then drawing straight lines joining them with rulers:—



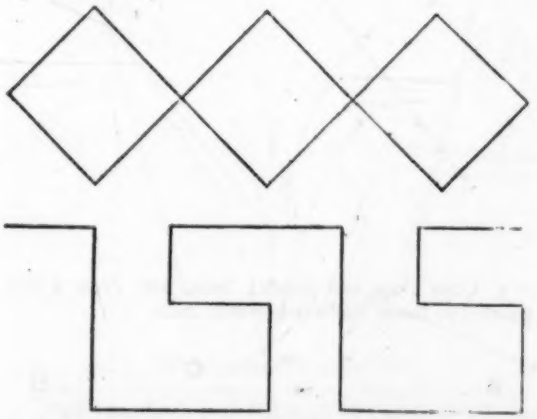
The other half had cards, and these were of two kinds, each containing two figures, the first to be drawn freehand, and the second with rulers and set-squares. The full size of the papers was taken, and they had to be divided into two equal parts, the free-hand copy being drawn in the upper half, and the ruled copy in the lower half, and each copy had to be drawn half as big again as the printed copy.

The following were the figures :—

(First Card.)



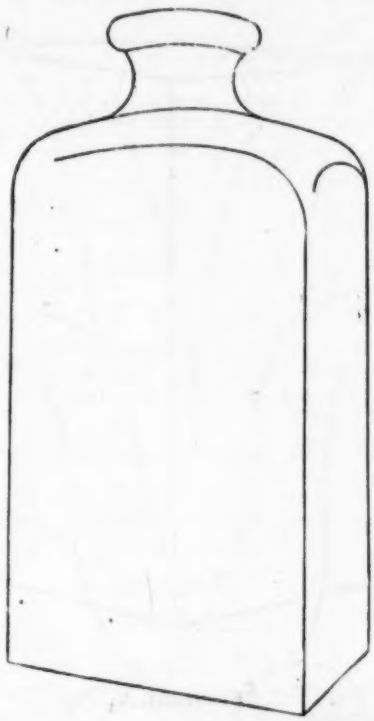
(*Second Card.*)



Note.—The first copy on each card was the free-hand copy.

Standard IV.

Freehand.—The following freehand copy was pinned on the blackboard, and had to be drawn by a third of the class on the clear side of the paper, a line being drawn with ruler in the middle of the paper within an inch of the top and bottom, and serving as the centre line of the figure :—



Scale Drawing.—Another third of the class took this subject, and cards were distributed containing two questions, the cards being marked alternately *on squared paper* and *on plain paper.*

The following were the problems :—

1. Draw the money box on squared paper. Each square stands for $\frac{1}{4}$ in.

2. Make a scale of 3 ft. 6 in., scale $\frac{1}{2}$ in. to 1 ft.

1. Draw a scale of $\frac{1}{2}$ in. to 1 ft.

2. This is the front view of a looking-glass. Copy it twice the size.

1. Draw the front view of a swing. Each square stands for 2 in.

2. Draw the side view of the shovel. Each square stands for $\frac{1}{2}$ in.

1. Draw a scale showing 2 ft. 2 in., scale $1\frac{1}{2}$ in. to 1 ft.

2. Draw the side view of the cottage three times the size.

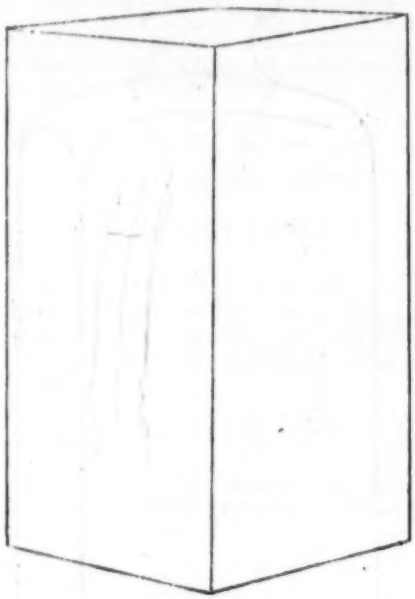
1. The drawing shows a side view of a sentry box. Each square stands for 2 in.

2. The drawing shows the view of a large screw. Each square stands for $\frac{1}{4}$ in.

Note.—Several boys had the same questions.

Model.—The remainder took model drawing. A square prism was placed on one of its smaller ends in the centre of a blackboard on two chairs, and which was consequently considerably below the level of the eye. The model only had to be drawn.

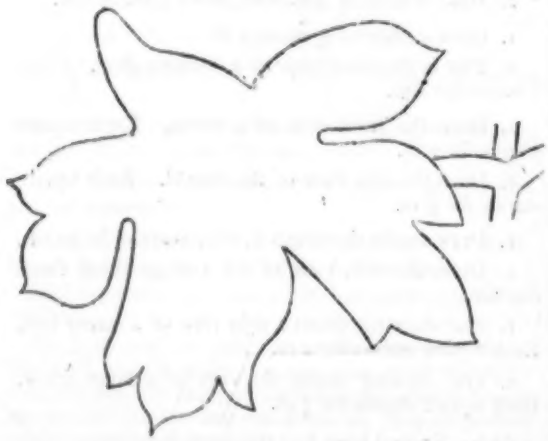
The following shows the view of the model from the position directly in front of it:—



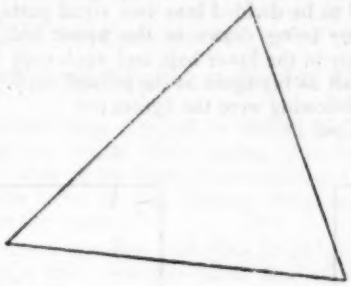
STANDARD V.

This Standard was also divided into three parts for the three subjects.

Freehand.—The following freehand copy was pinned on the blackboard, the Inspector telling the children to draw lines with rulers across and down the middle of the paper to ensure a large copy:—



Geometry.—The following were the geometrical problems, each card containing three questions, and several boys had the same problems:—



1. Copy the given triangle, and bisect one of its sides and one of its angles.

2. Draw two right lines each 2 feet long, which shall meet at an angle of 90°. This problem has to be worked to the scale of $1\frac{1}{4}$ inches to 1 foot.

3. Construct a triangle having a base of $2\frac{1}{2}$ inches, and angles of 45°, 45°, and 90°.

1. Construct a triangle having angles of 60°, 45°, and 75°, and base 2 inches.

2. Construct a 2 ft. square to the scale of $\frac{3}{4}$ inch to 1 foot.

3. Copy the given line and point A. From A draw a line perpendicular to the given line.

1. Copy these two parallel lines, and draw a line parallel to them, midway between them.

A C B

2. Copy the line AB and mark the point C. At C draw a line $1\frac{1}{2}$ inches long perpendicular to AB.

A——————————————B

3. Make the line AB the base of a triangle with angles of 30°, 60°, and 90°.

1. Make an angle of 60°, and bisect it.

·C

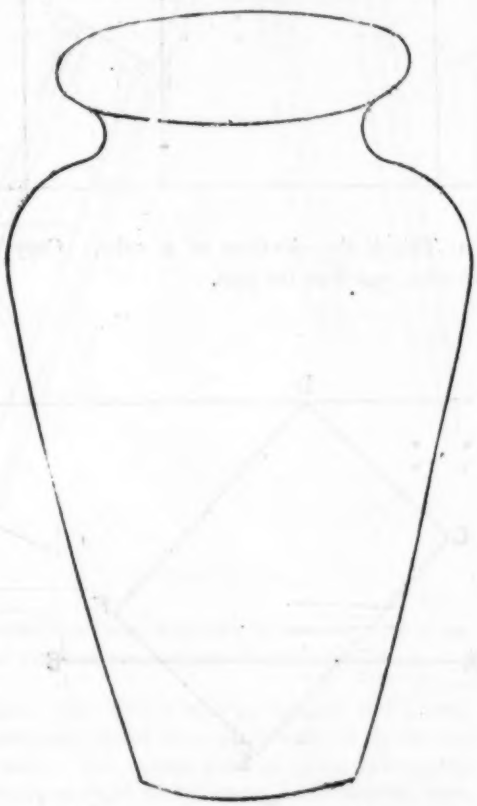
A . . . . . D

2. Draw a line parallel to AD through the point C.

3. Draw an isosceles triangle with base 2 inches, and the angle opposite the base 45°.

Model.—The model was a vase standing on a blackboard placed on two chairs, and it was considerably below the level of the eye. The vase only had to be drawn, a space of 2 inches being left at the top and bottom of the paper.

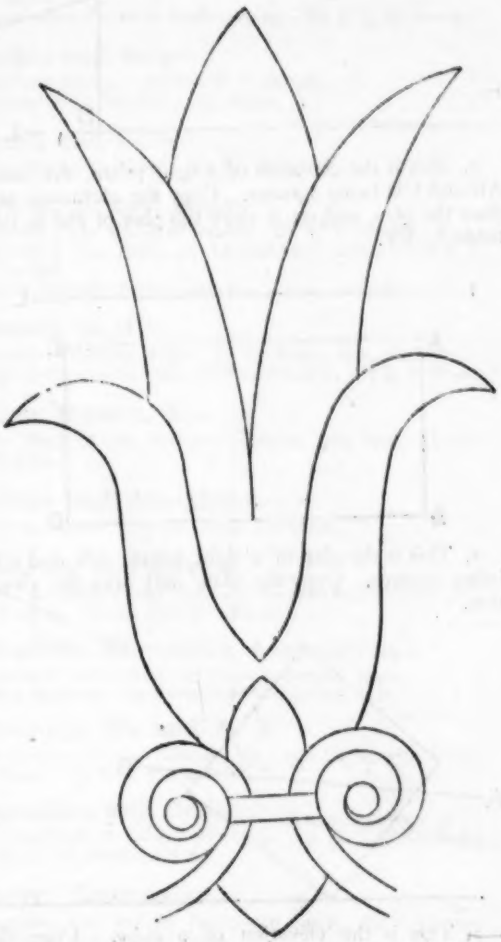
The following shows one of the views of it :—



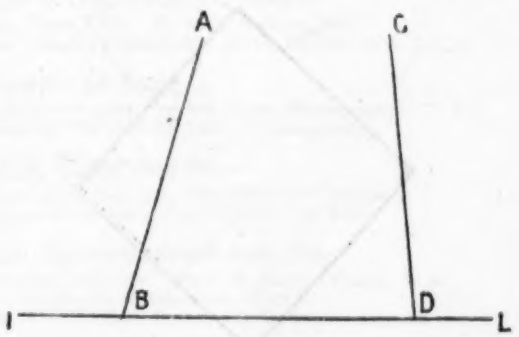
STANDARDS VI. AND VII.

Both Standards took the work of Standard VI., and as all tried for the card of merit, every boy took the three subjects.

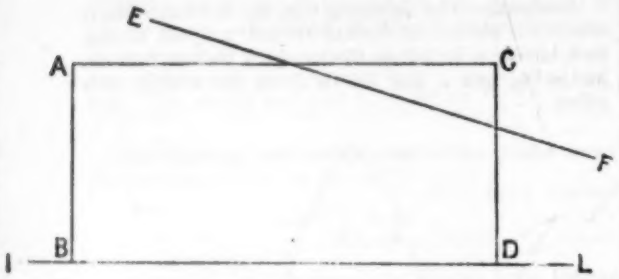
Freehand.—The following was the freehand copy, which was pinned on the blackboard, a space of one inch having to be left on the papers at the top, bottom, and sides, and a line drawn down the middle with rulers :—



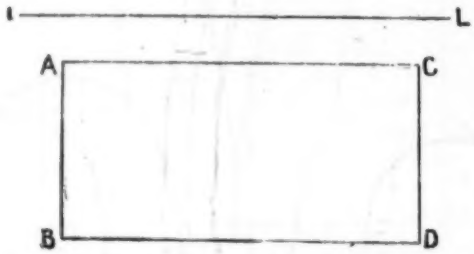
Solid Geometry.—Each card contained two problems, and several boys had the same questions.



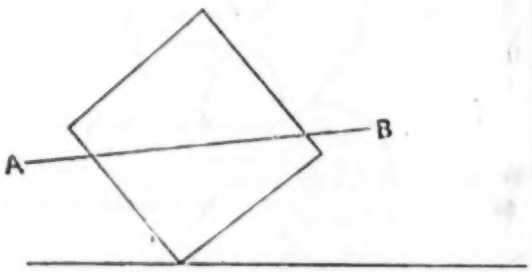
1. AB and CD are the elevations of two right lines, both parallel to the vertical plane. Copy the elevations, and draw plans.



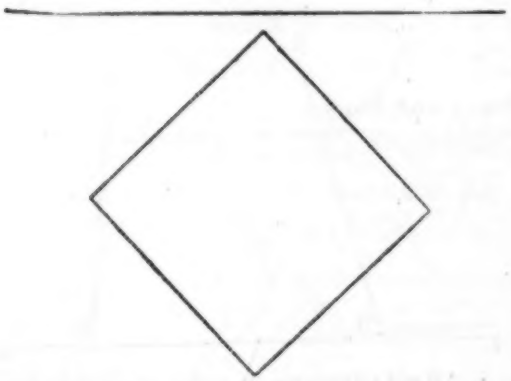
2. This is the elevation of a right prism, the bases AB and CD being squares. Copy the elevation, and draw the plan, and on it draw the plan of the section made by EF.



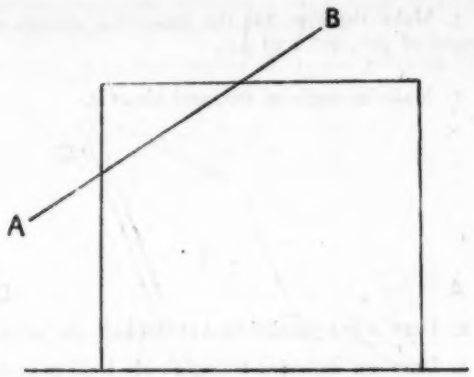
1. This is the plan of a right prism, AB and CD being squares. Copy the plan, and draw the elevation.



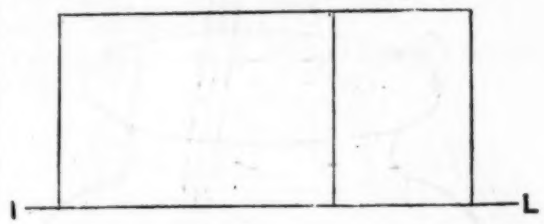
2. This is the elevation of a cube. Copy the elevation, and draw the plan, supposing the portion above AB to be taken away.



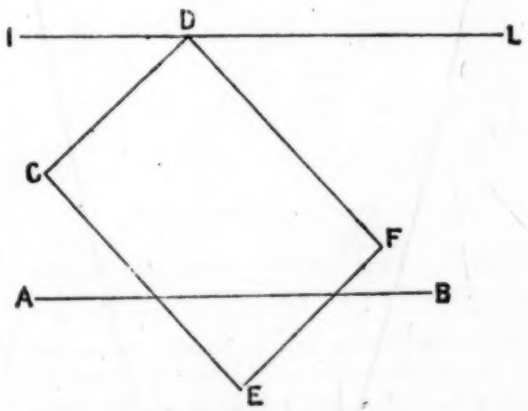
1. This is the plan of a cube. Copy the plan, and draw the elevation.



2. This is the elevation of a right prism, the bases being squares. The prism stands upon its base. Copy the elevation, and draw the plan, also the plan of the section made by AB.



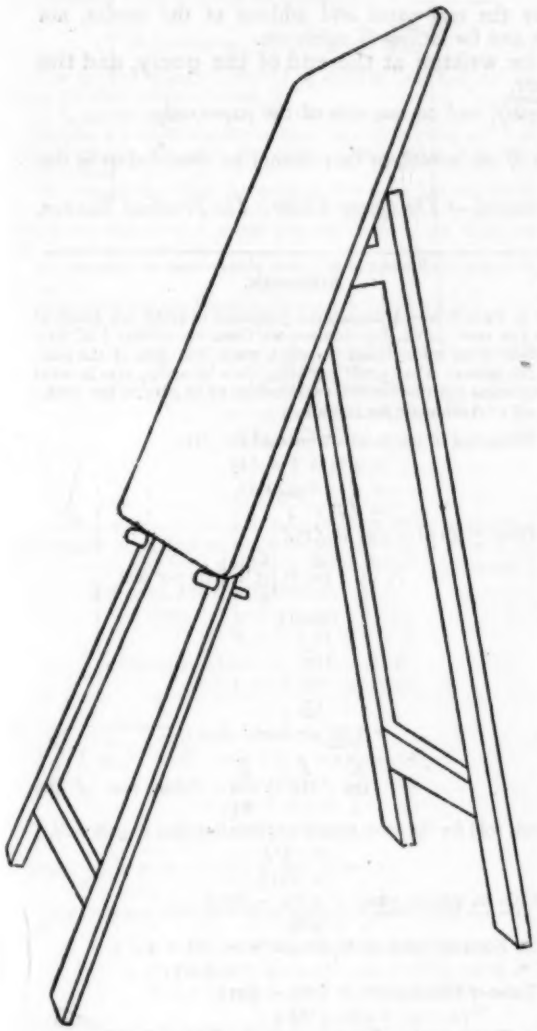
1. This is the elevation of a cube. Copy the elevation, and draw the plan.



2. This is the plan of a right prism, and CD and EF are squares. The diagonal in each square is parallel to the horizontal plane. Copy the plan, and draw its elevation, and also the elevation of the section made by AB.

Model.—The model was an easel and blackboard, placed at a very difficult angle.

The following shows one of the views of it:—



Second Grade.

Freehand.—There were two copies, viz., an ornamental vase and symmetrical ornamental work.

Model.—The models were a hexagon and a vase, not touching, placed on a blackboard which was on two chairs. The models were not in the centre, and the blackboard had to be drawn. The models were considerably below the level of the eye.

Publications Received.

Bell, G., and Sons—
English Passages for translation into French. By A. C. Clapin, M.A.
Examination Papers in Book-keeping. By J. T. Medhurst.

Blackie and Son—
Algebraic Factors. By Dr. W. T. Knight.
Shakespeare's Macbeth, with Notes.

Cassell and Co.—
The New Latin Primer. By Dr. Postgate.

Curwen, J., and Sons—
Operetta: The Voices of Nature. By N. B. Sargent.
Operetta: Too Bad; or, Discontented Judith. By A. J. Foxwell.
Action Songs for School Concerts. By A. L. Cowley.

Dawson, A. G.—
Standard Teaching Helps. By H. Major, B.A., B.Sc.
English Composition, and How to Teach it. By R. S. Wood.

Fisher Unwin, T.—
The Story of the Nations—Holland. By Prof. Thorold Rogers.

Hodder and Stoughton—
Sure to Succeed. By Dr. Thain Davidson.

Houlston and Sons—
The 'Beautiful Valley' Series of Sermons to Children, Nos. 5 and 6. By the Rev. John Bruster.

Industrial Education Association—
Aspects of Education. By Oscar Browning, M.A.
Mark Hopkins. By Leverett Wilson Spring, D.D.

Johnston, W. and A. K.—
Diagrams on Colour. Sheets No. 1 and No. 2, with Handbooks. By John Howard, F.C.S.

Macmillan and Co.—
A Text-Book of Euclid's Elements. By H. S. Hall, M.A., and F. H. Stevens, M.A.

Murby, Thomas—
Cantata: Elsa and the Imprisoned Fairy. By J. Gwynne Bettany and Thomas Murby.

Nelson, T., and Sons—
Royal Star Arithmetic. Standards 1 to 7 complete.

Oxford University Press—
Livy, Book XXII. By M. T. Tatham, M.A.
The Traveller (Goldsmith). By G. Birkbeck Hill, D.C.L.

Pitman and Sons—
Thankful Blossom. By Bret Harte (Phonography).
Gleanings from Popular Authors (Phonography).

Smith, Elder and Co.—
The Cornhill Magazine. September and October.
Suggestive Lessons in Practical Life. 1st Series.

Swan Sonnenschein and Co.—
A School Arithmetic. By G. H. Bateson Wright, M.A.
The Cyclopædia of Education. Part 8.
The N. G. A. Latin Primer. By G. Stewart Levack.

The Clarendon Press—
A Latin Prose Primer. By John Young Sargent, M.A.
An Introduction to Latin Syntax. By W. S. Gibson, M.A.

Query Column.

RULES.

1. Each correspondent is restricted to *one question*. We should be much obliged if correspondents, who send questions for solution, would give (if possible) the required answer, and the source from which the question is obtained.

2. No query can be answered unless accompanied by the real name and address of the sender, not necessarily for publication, but as a guarantee of good faith and for facility of reference.

3. ☞ When a pseudonym is adopted it should be written at the end of the query, and the real name and address on a separate piece of paper.

4. Correspondents are requested to write their queries *legibly*, and on one side of the paper only.

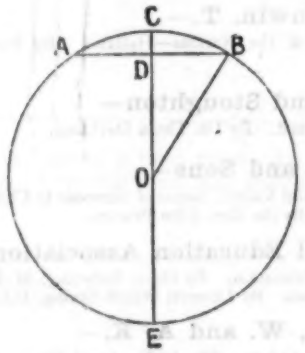
5. Replies will not be sent through the post.

6. Queries must reach the office *not later than the 12th of the month*, or they cannot be attended to in the following issue.

*** All communications for this column should be addressed—'*The Query Editor*,' *The Practical Teacher*, *Pilgrim Street, Ludgate Hill, London, E.C.*

Mensuration.

1. G. O. M.—The tip of a bud of lotus was seen a span above the water; forced by the wind it gradually advanced, and was submerged at a distance of two cubits. Compute the depth of the water. (*Barnard Smith.*)



Let AB represent the surface of the water, and OC the lotus; then at B the lotus is submerged, and DO represents the depth of the water.

CD represents a span = 9 in.; DB represents 2 cubits = 36 in.

First Method.

$$AD = DB = 36 \text{ in.}$$
$$CD \times DE = AD \times DB \quad \text{(III. 35.)}$$
$$9 \text{ in.} \times DE = 36 \text{ in.} \times 36 \text{ in.}$$
$$\therefore DE = 144 \text{ in.}$$
$$CE = CD + DE$$
$$= 9 \text{ in.} + 144 \text{ in.}$$
$$= 153 \text{ in.};$$
$$OC = \tfrac{1}{2} CE$$
$$= 76\tfrac{1}{2} \text{ in.};$$
$$\therefore \text{Depth of water } (DO) = 76\tfrac{1}{2} \text{ in.} - 9 \text{ in.}$$
$$= 67\tfrac{1}{2} \text{ in.}$$
$$= \underline{5 \text{ ft. } 7\tfrac{1}{2} \text{ in.}} \quad \text{Ans.}$$

Second Method.

$$OB^2 = OD^2 + DB^2 \quad \text{(I. 47.)}$$
$$= (OC - CD)^2 + DB^2$$
$$= (OB - 9)^2 + 36^2$$
$$= OB^2 - 18\,OB + 81 + 1296$$
$$18\,OB = 1377$$
$$\therefore OB = 76\tfrac{1}{2}.$$
$$\therefore OD \text{ (Depth of water)} = OB - CD$$
$$= (76\tfrac{1}{2} - 9) \text{ in.}$$
$$= \underline{5 \text{ ft. } 7\tfrac{1}{2} \text{ in.}} \quad \text{Ans.}$$

Arithmetic.

1. SKIPTON.—A tradesman proposed to retail his goods at 10 per cent. profit, but adulterates them by adding $\frac{1}{4}$ of their weight of an inferior article, which costs him $\frac{4}{5}$ths of the price of the better; what profit per cent. does he make, also in what proportion must he mix the two kinds so as to gain 20 per cent.? (*Lock's* 'Arithmetic for Schools.')

Prime cost of goods which are sold for £110
$$= £75 + \tfrac{1}{4} \text{ of } £25$$
$$= £75 + £20$$
$$= £95;$$
$$\text{Profit} = £110 - £95 = £15;$$
$$\therefore \underset{19}{£95} : \underset{}{£100} :: \underset{3}{£15} : \text{Gain per cent.}$$

$$)300(15$$
$$\underline{19}$$
$$110$$
$$\underline{95}$$
$$15$$

$$= \underline{15\tfrac{15}{19}} \text{ per cent.} \quad \text{Ans.}$$

$$\underset{3}{£120} : \underset{}{£110} :: \underset{25}{£100} : \text{Prime cost of the goods sold for the same money as preceding case to gain 20\%}$$
$$= 2\tfrac{3}{11} £$$
$$= £91\tfrac{3}{11}.$$
$$\text{Gain on inferior goods} = £100 - £91\tfrac{3}{11}$$
$$= £8\tfrac{8}{11};$$
$$\therefore \text{Nominal value of inferior goods} = £8\tfrac{8}{11} \times 5$$
$$= £41\tfrac{3}{11};$$
$$\text{Value of better goods} = £100 - £41\tfrac{3}{11}$$
$$= £58\tfrac{8}{11};$$
$$\therefore \text{Better goods} : \text{Inferior goods} :: £58\tfrac{8}{11} : £41\tfrac{3}{11}$$
$$:: 175 : 125$$
$$:: 7 : 5. \quad \text{Ans.}$$

2. SIENCYN PANTMOCH.—I leave home at 8 o'clock to catch a train. If I walk at the rate of 4 miles an hour, I shall be 10 minutes too late, and if I walk at the rate of 5 miles an hour I shall be 5 minutes too soon. How far is the station from my house, and when does the train start? (*Pupil Teachers' Examination*, October, 1887.)

$$\text{Difference in time between the rates} = (10 + 5) \text{ min.}$$
$$= 15 \text{ min.};$$
$$\text{Difference in time for 1 mile} = (\tfrac{60}{4} - \tfrac{60}{5}) \text{ min.}$$
$$= (15 - 12) \text{ min.}$$
$$= 3 \text{ min.};$$
$$\therefore \text{Distance from station} = \tfrac{15}{3} \text{ miles}$$
$$= 5 \text{ miles};$$

Time of arriving at station walking 5 miles an hour = 9 o'clock,

$\therefore$ Time of train starting = 5 min. past 9.

Trigonometry.

1. RUSTICUS.—In the *ambiguous case*, when a, b and A are given, show that the circles circumscribing both triangles are equal in magnitude, and that the distance between their centres is

$$\sqrt{a^2 \operatorname{cosec}^2 A - b^2}.$$

(*Todhunter's* 'Trigonometry for Beginners.')

$$R \text{ (radius)} = \frac{a}{2 \sin A}. \quad \text{(Page 118.)}$$

Now the two triangles denoted by ABC in Case I. of Art. 88 have the same values of a and A;

$\therefore$ R has the same value in the two triangles.

Suppose a straight line drawn from the middle point of CA at right angles to CA; then the centre of each circle is on this straight line.

The triangle for which the angle at B is acute has the centre of the circle on the same side of CA as B; the triangle for which the angle at B is obtuse has the centre of the circle on the opposite side of CA.

The distance of each centre from CA is numerically equal to R cos B.

Hence the distance between the centres = 2R cos B

$$= 2R\sqrt{1 - \sin^2 B}$$
$$= \sqrt{4R^2 - 4R^2 \sin^2 B}$$
$$= \sqrt{\frac{a^2}{\sin^2 A} - \frac{a^2 \sin^2 B}{\sin^2 A}}$$
$$= \sqrt{a^2 \operatorname{cosec}^2 A - b^2}.$$

Algebra.

1. HEATHER.—If the mth term of an A. P. be n, and the nth term be m, of how many terms will the sum be $\frac{1}{2}(m+n)(m+n-1)$, and what will be the last of them? (*Todhunter.*)

If a = first term, and d = difference,

Then, (1) $n = a + (m-1)d$
(2) $m = a + (n-1)d$

Subtracting] $n - m = (m-n)d$

$$(m-n)d = -(m-n)$$
$$\therefore d = -1.$$
$$(1)\ n = a + (m-1)d$$
$$= a + [(m-1) \times -1]$$
$$= a - m + 1$$
$$\therefore a = m + n - 1.$$

Let x = No. of terms;

Then, $\frac{x}{2}[2a + (x-1)d]$ = Sum of terms;

$$\therefore \frac{x}{2}\{2(m+n-1) + [(x-1) \times -1]\} = \tfrac{1}{2}(m+n)(m+n-1)$$
$$x(2m + 2n - 2 - x + 1) = (m+n)(m+n-1)$$
$$-x^2 + x(2m + 2n - 1) = (m+n)^2 - (m+n)$$
$$x^2 - x(2m + 2n - 1) = -(m+n)^2 + (m+n)$$

Completing the square $\Big\}$
$$x^2 - x(2m + 2n - 1) + \left(\frac{2m + 2n - 1}{2}\right)^2$$
$$= \left(\frac{2m + 2n - 1}{2}\right)^2 - (m+n)^2 + (m+n)$$
$$= [(m+n) - \tfrac{1}{2}]^2 - (m+n)^2 + (m+n)$$
$$= (m+n)^2 - (m+n) + \tfrac{1}{4} - (m+n)^2 + (m+n)$$
$$= \tfrac{1}{4}$$

Extracting square root $\Big\}$
$$x - \frac{2m + 2n - 1}{2} = \pm \tfrac{1}{2}$$
$$\therefore x = m + n - \tfrac{1}{2} \pm \tfrac{1}{2}$$
$$= (m+n-1), \text{ or } (m+n).$$

In the former case the last term

$$= (m+n-1) + [\{(m+n-1) - 1\} \times -1]$$
$$= m + n - 1 - m - n + 2$$
$$= 1.$$

In the latter case the last term

$$= (m+n-1) + \{[(m+n) - 1] \times -1\}$$
$$= m + n - 1 - m - n + 1$$
$$= 0.$$

2. JEAN.—A man aged 45 has a pension of £300 a year during his own life; he wishes to exchange it for another to continue not only during his life, but that of his wife, aged 40. What will be this pension reckoning compound interest at 5 per cent.?

Let us take the expectation of life at 45 to be 20, and at 40 to be 22.

Note.—We have not got the Carlisle Tables of Mortality to get the precise information.

We require the Present Value of the annuity of £300 at 5 per cent. for 20 years, and then we have to calculate the annuity for 22 years that will have the same present value.

Let P denote the present value in pounds, R the amount of one pound in one year, n the number of years, and A the annuity in pounds.

Then (1) $PR^n = \frac{R^n - 1}{R - 1}A,$

$$\therefore P \times (\tfrac{21}{20})^{20} = \frac{(\frac{21}{20})^{20} - 1}{\frac{21}{20} - 1} \times 300,$$
$$P \times (1{\cdot}05)^{20} = \frac{(1{\cdot}05)^{20} - 1}{\frac{1}{20}} \times 300,$$

Now, log $(1{\cdot}05^{20})$ = 20 times log 1·05
$$= {\cdot}0211892991 \times 20$$
$$= {\cdot}423785982$$
$$= \log 2{\cdot}6532972;$$
$$P \times 2{\cdot}6532972 = 1{\cdot}6532972 \times 6000,$$
$$\therefore P = \frac{4133243 \times 6000}{6633243}\,£$$
$$= \frac{4133243 \times 2000}{2211081}\,£$$
$$= \frac{8266486000}{2211081}\,£.$$

(2) $PR^n = \frac{R^n - 1}{R - 1}A,$

$$\therefore \frac{8266486000}{2211081} \times (1{\cdot}05)^{22} = \frac{(1{\cdot}05)^{22} - 1}{\frac{1}{20}}A,$$

Now, log $(1{\cdot}05^{22})$ = 22 times log 1·05
$$= {\cdot}0211892991 \times 22$$
$$= {\cdot}4661645802$$
$$= \log 2{\cdot}9252605;$$
$$\frac{8266486000}{2211081} \times 2{\cdot}9252605 = 1{\cdot}9252605 \times 20A,$$
$$\therefore A = \frac{413324300 \quad 5850521}{2211081 \times 19252605 \times 20}\,£$$
$$3850521$$
$$= \frac{2418162486900300}{8513813885501}\,£$$
$$= £284\text{ os. }6\tfrac{3}{4}\text{d.} \quad \text{Ans.}$$

3. D. TAYLOR.—Solve:—

$$x^2 + y = 11$$
$$y^2 + x = 7$$

First Method.

(1) $x^2 + y = 11$
(2) $y^2 + x = 7$

Subtracting] $x^2 - y^2 - x + y = 4$

$$(x^2 - y^2) - (x - y) = 4$$
$$(x+y)(x-y) - (x-y) = 4$$
$$(x-y)(x+y-1) = 1 \times 4$$

Let $x - y = 1$
And $x + y - 1 = 4$

Then, $x - y = 1$
$x + y = 5$

$$2x = 6$$
$$\therefore x = 3.$$
$$2y = 4$$
$$\therefore y = 2.$$
$$\therefore x = 3 \text{ and } y = 2.$$

Query Column.

RULES.

1. Each correspondent is restricted to *one question*. We should be much obliged if correspondents, who send questions for solution, would give (if possible) the required answer, and the source from which the question is obtained.

2. No query can be answered unless accompanied by the real name and address of the sender, not necessarily for publication, but as a guarantee of good faith and for facility of reference.

3. ☞ When a pseudonym is adopted it should be written at the end of the query, and the real name and address on a separate piece of paper.

4. Correspondents are requested to write their queries *legibly*, and on one side of the paper only.

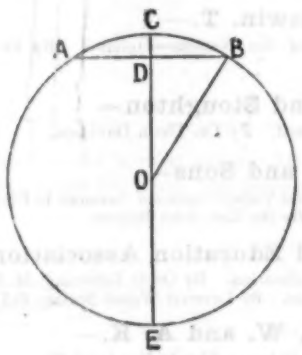
5. Replies will not be sent through the post.

6. Queries must reach the office *not later than the 12th of the month*, or they cannot be attended to in the following issue.

*** All communications for this column should be addressed—'*The Query Editor*,' *The Practical Teacher*, *Pilgrim Street, Ludgate Hill, London, E.C.*

Mensuration.

1. G. O. M.—The tip of a bud of lotus was seen a span above the water; forced by the wind it gradually advanced, and was submerged at a distance of two cubits. Compute the depth of the water. (*Barnard Smith.*)



Let AB represent the surface of the water, and OC the lotus; then at B the lotus is submerged, and DO represents the depth of the water.

CD represents a span = 9 in.; DB represents 2 cubits = 36 in.

First Method.

$$AD = DB = 36 \text{ in.}$$
$$CD \times DE = AD \times DB \quad \text{(III. 35.)}$$
$$9 \text{ in.} \times DE = 36 \text{ in.} \times 36 \text{ in.}$$
$$\therefore DE = 144 \text{ in.}$$
$$CE = CD + DE$$
$$= 9 \text{ in.} + 144 \text{ in.}$$
$$= 153 \text{ in.};$$
$$OC = \tfrac{1}{2} CE$$
$$= 76\tfrac{1}{2} \text{ in.};$$
$$\therefore \text{Depth of water } (DO) = 76\tfrac{1}{2} \text{ in.} - 9 \text{ in.}$$
$$= 67\tfrac{1}{2} \text{ in.}$$
$$= \underline{5 \text{ ft. } 7\tfrac{1}{2} \text{ in.}} \quad \text{Ans.}$$

Second Method.

$$OB^2 = OD^2 + DB^2 \quad \text{(I. 47.)}$$
$$= (OC - CD)^2 + DB^2$$
$$= (OB - 9)^2 + 36^2$$
$$= OB^2 - 18\,OB + 81 + 1296$$
$$18\,OB = 1377$$
$$\therefore OB = 76\tfrac{1}{2}.$$
$$\therefore OD \text{ (Depth of water)} = OB - CD$$
$$= (76\tfrac{1}{2} - 9) \text{ in.}$$
$$= \underline{5 \text{ ft. } 7\tfrac{1}{2} \text{ in.}} \quad \text{Ans.}$$

Arithmetic.

1. SKIPTON.—A tradesman proposed to retail his goods at 10 per cent. profit, but adulterates them by adding $\frac{1}{4}$ of their weight of an inferior article, which costs him $\frac{4}{5}$ths of the price of the better; what profit per cent. does he make, also in what proportion must he mix the two kinds so as to gain 20 per cent.? (*Lock's* 'Arithmetic for Schools.')

Prime cost of goods which are sold for £110
$$= £75 + \tfrac{1}{5} \text{ of } £25$$
$$= £75 + £20$$
$$= £95;$$
$$\text{Profit} = £110 - £95 = £15;$$
$$\therefore \underset{19}{£95} : \underset{1}{£100} :: \underset{3}{£15} : \text{Gain per cent.}$$

$$)300(15$$
$$\frac{19}{110}$$
$$\frac{95}{15}$$

$$= \underline{15\tfrac{15}{19}} \text{ per cent.} \quad \text{Ans.}$$

$$\underset{3}{£120} : \underset{1}{£110} :: \underset{25}{£100} : \text{Prime cost of the}$$

goods sold for the same money as preceding case to gain 20%
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$$\text{Gain on inferior goods} = £100 - £91\tfrac{2}{3}$$
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$$\therefore \text{Nominal value of inferior goods} = £8\tfrac{1}{3} \times 5$$
$$= £41\tfrac{2}{3};$$
$$\text{Value of better goods} = £100 - £41\tfrac{2}{3}$$
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$$\therefore \text{Better goods} : \text{Inferior goods} :: £58\tfrac{1}{3} : £41\tfrac{2}{3}$$
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2. SIENCYN PANTMOCH.—I leave home at 8 o'clock to catch a train. If I walk at the rate of 4 miles an hour, I shall be 10 minutes too late, and if I walk at the rate of 5 miles an hour I shall be 5 minutes too soon. How far is the station from my house, and when does the train start? (*Pupil Teachers' Examination*, October, 1887.)

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The distance of each centre from CA is numerically equal to R cos B.

Hence the distance between the centres $= 2R \cos B$

$$= 2R\sqrt{1 - \sin^2 B}$$
$$= \sqrt{4R^2 - 4R^2 \sin^2 B}$$
$$= \sqrt{\frac{a^2}{\sin^2 A} - \frac{a^2 \sin^2 B}{\sin^2 A}}$$
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Algebra.

1. HEATHER.—If the mth term of an A. P. be n, and the nth term be m, of how many terms will the sum be $\frac{1}{2}(m+n)(m+n-1)$, and what will be the last of them? (*Todhunter.*)

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Completing the square $\Big\}$ $x^2 - x(2m + 2n - 1) + \left(\frac{2m + 2n - 1}{2}\right)^2$

$$= \left(\frac{2m + 2n - 1}{2}\right)^2 - (m+n)^2 + (m+n)$$
$$= [(m+n) - \tfrac{1}{2}]^2 - (m+n)^2 + (m+n)$$
$$= (m+n)^2 - (m+n) + \tfrac{1}{4} - (m+n)^2 + (m+n)$$
$$= \tfrac{1}{4}$$

Extracting square root $\Big\}$ $x - \frac{2m + 2n - 1}{2} = \pm \frac{1}{2}$

$$\therefore x = m + n - \tfrac{1}{2} \pm \tfrac{1}{2}$$
$$= (m+n-1), \text{ or } (m+n).$$

In the former case the last term

$$= (m+n-1) + [\{(m+n-1) - 1\} \times -1]$$
$$= m + n - 1 - m - n + 2$$
$$= 1.$$

In the latter case the last term

$$= (m+n-1) + \{[(m+n) - 1] \times -1\}$$
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Then (1) $PR^n = \frac{R^n - 1}{R - 1}A,$

$$\therefore P \times (\tfrac{21}{20})^{20} = \frac{(\frac{21}{20})^{20} - 1}{\frac{21}{20} - 1} \times 300,$$
$$P \times (1{\cdot}05)^{20} = \frac{(1{\cdot}05)^{20} - 1}{\frac{1}{20}} \times 300,$$

Now, log $(1{\cdot}05^{20})$ = 20 times log 1·05
= ·0211892991 × 20
= ·423785982
= log 2·6532972;

$$P \times 2{\cdot}6532972 = 1{\cdot}6532972 \times 6000,$$
$$\therefore P = \frac{4133243 \times 6000}{6633243}\ £$$
$$= \frac{4133243 \times 2000}{2211081}\ £$$
$$= \tfrac{8266486000}{2211081}\ £.$$

(2) $PR^n = \frac{R^n - 1}{R - 1}A,$

$$\therefore \tfrac{8266486000}{2211081} \times (1{\cdot}05)^{22} = \frac{(1{\cdot}05)^{22} - 1}{\frac{1}{20}}A,$$

Now, log $(1{\cdot}05^{22})$ = 22 times log 1·05
= ·0211892991 × 22
= ·4661645802
= log 2·9252605;

$$\tfrac{8266486000}{22.1081} \times 2{\cdot}9252605 = 1{\cdot}9252605 \times 20A,$$
$$\therefore A = \frac{\overset{413324300}{8266486000} \times \overset{5850521}{2{\cdot}9252605}}{2211081 \times \underset{3850521}{1{\cdot}9252605} \times 20}\ £$$
$$= \tfrac{24181634065800300}{8513981932201}\ £$$
$$= \underline{£284\text{ os. }6\tfrac{3}{4}\text{d.}} \quad \text{Ans.}$$

3. D. TAYLOR.—Solve:—

$$x^2 + y = 11$$
$$y^2 + x = 7$$

First Method.

(1) $x^2 + y = 11$
(2) $y^2 + x = 7$

Subtracting] $x^2 - y^2 - x + y = 4$

$$(x^2 - y^2) - (x - y) = 4$$
$$(x+y)(x-y) - (x-y) = 4$$
$$(x-y)(x+y-1) = 1 \times 4$$

Let $x - y = 1$
And $x + y - 1 = 4$

Then, $x - y = 1$
$x + y = 5$

$$2x = 6$$
$$\therefore x = 3.$$
$$2y = 4$$
$$\therefore y = 2.$$
$$\therefore x = 3 \text{ and } y = 2.$$

Second Method.

$$\left.\begin{array}{ll}(1) & x^2+y=11\\(2) & y^2+x=7\end{array}\right\}$$

From (1) $y = 11 - x^2$;

$\therefore$ (2) $(11-x^2)^2 + x = 7$

$121 - 22x^2 + x^4 + x = 7$

$x^4 - 22x^2 + x + 114 = 0$

$(x-3)(x^3+3x^2-13x-38) = 0$

If $x - 3 = 0$

Then $x = 3$;

If $x^3 + 3x^2 - 13x - 38 = 0$, we have a cubic equation, which gives imaginary values for x.

$\therefore$ The only integral solution is $x = 3$ and $y = 11 - x^2 = 2$.

General.

1. W. R. SEYMOUR.—A sluice gate, 10 feet square, is placed vertically in water, the upper side coinciding with the surface of the fluid; required the pressure on the upper and lower halves of the gate. (*Wormell's* 'Hydrostatics.')

Depth of centre of gravity of gate $= \frac{10}{2}$ ft.

$= 5$ ft.

,, ,, upper half $= \frac{5}{2}$ ft.;

$\therefore$ Pressure on whole gate $= (10^2 \times 5 \times 1000)$ oz.

$= 500{,}000$ oz.

$= 31{,}250$ lbs.;

,, upper half $= (10 \times 5 \times \frac{5}{2} \times 1000)$ oz.

$= 125{,}000$ oz.

$= 7{,}812\frac{1}{2}$ lbs.;

,, lower half $= (31{,}250 - 7{,}812\frac{1}{2})$ lbs.

$= \underline{23{,}437\frac{1}{2}}$ lbs.

Or, centre of gravity of lower half $= 5$ ft. $+ \frac{5}{2}$ ft.

$= \frac{15}{2}$ ft.;

$\therefore$ Pressure on lower half $= (10 \times 5 \times \frac{15}{2} \times 1000)$ oz.

$= 375{,}000$ oz.

$= \underline{23{,}437\frac{1}{2}}$ lbs.

2. S. YEARSLEY.—Kindly repeat your query as there is a word which is not intelligible, and we have not the questions to which we could refer.

3. MATER.—Try Lock's 'Trigonometry,' Part I., C. Smith's or Todhunter's 'Algebra,' and Todhunter's 'Euclid.' Chambers' 'Euclid' you would find very useful. The questions you name can be purchased in a 6d. pamphlet. They are published by Eyre and Spottiswoode. The syllabus is contained in the directory, but you only want parts of it. You could have them sent to you direct by post by writing to the department and enclosing 2d. in stamps. You need not prepay the letter.

4. J. J. M.—You have to take groups, and the subjects in one group where there are more than one are considered a whole. What you imply is that if you did badly in one or more subjects you might fail although you did excellently in the others. There is not much fear on that head. Try to do moderately well in all the subjects you are examined in.

5. JONES.—There are certain subjects fixed and others vary from time to time. You will obtain all information by writing for a copy of the syllabus to the Registrar, Burlington House, Piccadilly, W.C.

6. H. T. T.—In Todhunter's treatise on Conic Sections the subject is treated analytically. For the Geometrical treatment you can use Richardson's book (Rivington & Co.) or Drew's 'Conic Sections.' Wilson's 'Solid Geometry' is very good.

7. EN TENEBRES.—Yes we hope so. We do not understand the second question. All who take first year's papers have to take Mental Arithmetic.

8. B.Sc.—The syllabus covers a good deal. All the books you name are good, the author of the 'Experimental Physics' we could not make out. You had better make arrangements for working at the subject practically. You might find Glazebrook's 'Optics' useful. Formerly it was almost necessary to read Maxwell's 'Heat,' a very excellent and in parts very difficult text-book. Balfour Stewart's 'Heat' is good, so is Tait's.

9. A. M.—We do not profess to give an exhaustive list. Fowne's manual of 'Organic Chemistry' is good. Add to it Remsen's 'Organic Chemistry,' or Morley's; 'Deschanel,' Ganôt; 'Optics,' Glazebrook; 'Practical Physics' by B. Stewart, or Glazebrook; Maxwell's 'Heat' and Tait's; Foster's 'Physiology, Theoretical and Practical.' You are not likely to succeed in Physiology unless you get practical instruction in the use of the instruments of research. The last question is in this case of no importance.

10. LEX.—Erskine May is the author of a work likely to help you. Have you consulted Hallam's 'Constitutional History'? A public library would be likely to contain both.

11. INDECIS.—If you find that teaching is irritating and disheartening work by all means turn your attention to something else. It will be better for you and better for the children. We cannot undertake to give advice on the choice of a profession. If you have no higher motive than getting the most for doing the least you are not likely to succeed in anything. If after all you decide to become a teacher, get the completest training within your reach.

12. W. A.—In each case write to the Secretary. He will give you all needful information.

13. EVA.—We only distinguish two kinds of writing on the sheet, large and small. Both are carefully written. They are legible and bold. They have no other merit. There seems to be no attempt at uniformity or correctness of shape, much less of elegance. Use Cowham's Copy Books. There may be others as good but we do not know them; there are none better.

14. G. CAIRNS.—Read Syllabus and in connection with it parts of Fownes, Roscoe, Miller; for Practical, Valentine's Analysis (new edition).

15. PARCHMENT.—Smith's 'Latin Grammar' is clear and sufficient. The key to the book you name can be got at the publisher of the composition if you satisfy him that you are a *bond fide* student. Second part, yes.

16. PLYMOUTH.—If you passed in the four subjects before May, 1888, you can complete your D by passing either this year or next year the black board drawing from memory, as before. The examination is held at the Training colleges early in November. You are probably too late for this year, but you might possibly find a vacancy if you applied to a Training College at once.

17. S. E. POLAK.—(1) Yes, either this year or next year, not later. (2) About October the 8th. (3) There is no reliable book; Poynter's Drawing for the Standards, published by Blackie, is good; the parts containing instruction in Model Drawing might be helpful.

18. E. M.—We cannot give you the information you ask. You should apply at once to the Secretary of the Science and Art Department.

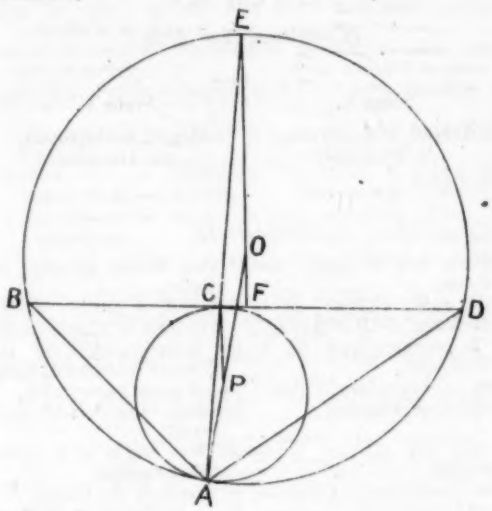
19. IGNORAMUS.—The reference in page 334 is to those who take 2nd year papers. The Algebra paper has hitherto contained some questions in Mensuration. In future the questions in Mensuration are only to be taken by those who have passed satisfactorily in Arithmetic.

20. IN DIFFICULTIES.—There are no ambiguities in the syllabus. You are obliged to take certain groups, and you cannot take more than four, hence you are precluded from taking the language group at all.

21. C. W.—Very often one book will not do what you want. Use the book you have and supplement it with any other manuals you possess, such as those of Lock, Magnus, Todhunter.

Geometry.

1. SUBTRISTIS.—If two circles touch each other internally, any chord of the greater circle which touches the less shall be divided at the point of its contact into segments, which subtend equal angles at the point of contact of the two circles. (*Todhunter.*)



Let the two circles touch each other at A.

Let O be the centre of the larger circle, and P the centre of the smaller.

Let BCD be a chord of the larger circle touching the smaller circle at C.

Then BC, CD shall subtend equal angles at A.

Join AC, and produce it to cut the larger circle at E.

Now A, P, O are in one straight line. (III. 11.)

Draw the line AO. Join AB, AD, PC, OE, and produce EO to meet BD in F.

Proof.— $\left.\begin{array}{l}\angle PAC = \angle PCA \\ \text{and } \angle OAC = \angle OEA\end{array}\right\}$ (I. 5.)

$\therefore \angle PCA = \angle OEA$; (Ax. 1.)

Wherefore OE is parallel to PC. (I. 28.)

Now PC is at right angles to BD, (III. 18.)

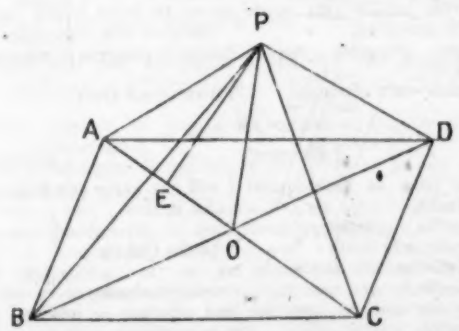
$\therefore$ EF is at right angles to BD; (I. 29.)

Wherefore EF bisects BD (III. 3.), and therefore arc BE = arc ED;

$\therefore \angle BAE = \angle DAE$. (III. 27.)

Q. E. D.

2. THE OLD MAN OF CARMEL.—If a circle be described round the point of intersection of the diameters of a parallelogram as a centre, show that the sum of the squares on the straight lines drawn from any point in its circumference to the four angular points of the parallelogram is constant. (*Todhunter.*)



Let ABCD be a parallelogram, and let the diagonals AC, BD intersect at O.

Let a circle be described from O as centre, and let P be any point on the circumference of this circle. Join PA, PB, PC, PD, PO.

Proof.—In any triangle the sum of the squares on the sides of the triangle is equal to twice the square on half the base, together with twice the square on the straight line which joins the vertex to the middle point of the base.

Draw PE perpendicular to AC. (I. 12.)

Then, $PA^2 = AO^2 + PO^2 - 2AO.OE$, (II. 13.)

$PC^2 = CO^2 + PO^2 + 2CO.OE$ (II. 12.)

$= AO^2 + PO^2 + 2AO.OE$;

$\therefore PA^2 + PC^2 = 2AO^2 + 2PO^2$. (Ax. 2.)

This remains constant at whatever point of the circumference P may be.

Similarly the sum of the squares on PB, PD may be proved to be equal to twice the square on BO and twice the square on PO, and therefore it also remains constant.

$\therefore$ Sum of squares on PA, PB, PC, PD remains constant.

Q. E. D.

Pupil Teachers and the Royal Commission on Education.

MANY of the Pupil Teachers who read this Magazine will know that for more than two years a Royal Commission has been sitting, inquiring into the working of the Elementary Education Acts. During that time they have taken a great deal of evidence, that concerning Pupil Teachers being very important. There is not the slightest doubt that changes will be made on the lines of the report of the Commission. We wish the Pupil Teachers who read our pages to be prepared for these changes. Considerable complaints were made about the inadequate preparation of Pupil Teachers for the training given in the Training Colleges. These complaints were not without foundation. Nearly 29 per cent. of the Pupil Teachers who sit at the Scholarship Examination fail to pass it, although it covers only the work of the Pupil Teachership. Of those who do pass the greater proportion pass only in the second and third classes. This shows that either there has been a great want of ability or attention to study on the part of the Pupil Teacher, or that he has been badly taught. The Commissioners seem to think that there is room for improvement, both in the Pupil Teacher himself and in the method of his training. Statistics were laid before them which showed that Pupil Teachers who were taught in central classes did better than those who were taught only at their own schools. They therefore strongly recommend that wherever possible Pupil Teachers should be taught in central classes, or at least that the teaching at the schools by their own masters or mistresses should be supplemented by teaching in such classes. Now it is evident that in very many of the villages and smaller towns of the country such central classes cannot be formed. We trust, therefore, that Pupil Teachers and their Head Teachers will make still more use of the aid we try to render them in these columns every month. By following the advice we give, and diligently working the exercises we from time to time provide, much progress will be made, faults will be corrected, help obtained, and some of the advantages of central class teaching secured.

Another of the recommendations of the Commissioners is that more time should be allowed to Pupil Teachers for their own studies, especially in their first year of service. We think that this is greatly needed. A good foundation can be better laid between fourteen and sixteen than afterwards. Experience has taught us that where Pupil Teachers do nothing beyond the mere requirements of Schedule V. of the Code in their early years they seldom get beyond it afterwards, and no candidate can get a good place in the Scholarship List who has not some knowledge of science and languages in addition. We would especially urge Pupil Teachers, who are now in the early years of their apprenticeship, to get beyond the mere requirements of their year in all their ordinary subjects, so as to leave more time for extra subjects afterwards.

A Pupil Teacher who has passed Standard VII. before entering on his apprenticeship should have a very good knowledge of all the ordinary subjects taught in the school. It should not be much trouble for such an one to fairly master the whole of the first year's course in six months. The other six months might very well be employed in doing something beyond the requirements of the year. The whole of the grammar and arithmetic of the second year should be attempted, and a language commenced.

Some of the Commissioners are strongly of opinion that no ex-Pupil Teachers should be allowed to be employed at the close of their apprenticeship who do not at least pass the Scholarship Examination in the first or second division. If their opinions are accepted, and there is great likelihood that they will be, a vast improvement must take place, for during the past four years an average of more than 1,100 have failed each year even to get into the third division. It will be well, therefore, for those who wish to follow the profession after their apprenticeship is over, to work the harder now, so that they may not fail when it comes to a close.

All the Commissioners agree in the opinion that better arrangements should be made for removing Pupil Teachers who are unfit for their work. That unfitness very often arises from inattention on the part of the Pupil Teacher to instructions given him by the Head Teacher. We cannot have any sympathy with one who does not do his utmost to follow a good pattern given him, but we can and do sympathise with a Pupil Teacher who is not properly instructed and trained. Evidence was given to show that nearly 25 per cent. of the students in at least two colleges had not received their due amount of instruction. The report recommends that Pupil Teachers be not indentured except in schools where due care will be taken of their instruction and training, and where such has not been taken the privilege of having Pupil Teachers should be removed.

As we have already said, we cannot tell how soon, or how many of, these recommendations will be accepted by the Government and become law. They will all tend to improve the education of the country, and we strongly advise both Head Teachers and Pupil Teachers who are anxious for the well-being of themselves and their schools to adopt them, or bring themselves abreast of them at as early a date as possible.

The Glass of Water; or, Cause and Effect.

(Comedy in Five Acts.)

LE VERRE D'EAU; OU, LES EFFETS ET LES CAUSES.

(Comédie en Cinq Actes.)

Scène V.	Scene V.
Abigaïl, Bolingbroke, la Duchesse.	Abigail, Bolingbroke, the Duchess.

* * * * * * *

Bolingbroke.

Parente fort éloignée, sans doute...	A very distant relation, no doubt,
mais enfin, cousine de la duchesse de Marlborough,	but still, a cousin of the Duchess of Marlborough,
de la surintendante de la reine, qui,	the Superintendent of the Queen's household, who,
dans sa sévère impartialité,	in her strict impartiality,
hésite et se demande	hesitates and debates with herself
si elle est d'assez bonne maison	whether she is of a family noble enough
pour approcher de Sa Majesté.	to approach the Queen.
Vous comprenez, madame, que pour moi,	You understand, madam, that, as far as I am concerned,
qui suis un écrivain usé et passé de mode,	I am a hackneyed writer, and altogether out of fashion,
il y aurait dans le récit de cette aventure	but there would be in the story of that adventure
de quoi me remettre en vogue auprès de mes lecteurs,	enough (wherewith) to bring me into fashion again with my readers,
et que le journal *l'Examinateur* aurait beau jeu	and the *Examiner* would have a fine opportunity
dès demain à s'égayer sur la noble duchesse,	from to-morrow to make merry at the expense of the noble Duchess,
cousine de la demoiselle de boutique...	the cousin of a shopgirl.
Mais rassurez-vous, madame,	But be reassured, Madam,
votre amitié est trop nécessaire à votre jeune parente,	your friendship is too necessary to your young relation
pour que je veuille la lui faire perdre ;	for me to wish to cause her to lose it ;
et à la condition qu'elle sera aujourd'hui admise	and on condition that she shall to-day be admitted by you
par vous dans la maison de Sa Majesté,	into her Majesty's household
je m'engage sur l'honneur	I give you my word of honour
à n'avoir jamais rien su de cette anecdote,	never to have heard anything of this anecdote,
quelque piquante qu'elle soit...	however pungent it may be.
J'attends votre réponse.	I await your reply.

The Duchess.

[*fièrement.*	[*proudly*
Je ne vous la ferai point attendre.	I will not keep you waiting for it.
Je devais présenter mon rapport à la reine	I am to present my report to the Queen
sur l'admission de mademoiselle,	as to the admission of mademoiselle,
et qu'elle soit ou non ma parente,	and whether or not she is my relative,

cela ne changera rien à ma décision ;
that will change nothing in my decision ;
je la ferai connaître à Sa Majesté...à elle seule !...
I shall make it known to her Majesty and to her alone.
Quant à vous, monsieur, il vous suffira de savoir
As to you, Sir, it will be sufficient for you to know
que je n'ai jamais rien accordé à la menace,
that I have never yielded to threats,
arme impuissante, du reste, que je dédaigne...
a powerless arm, moreover, which I despise,
et si j'y ai recours aujourd'hui,
and if I have recourse to it to-day,
c'est que vous m'y aurez forcée...
it is you who have forced me to do so.
Quand on est publiciste, monsieur de Saint-Jean,
When one is a journalist, Monsieur de St. Jean,
et surtout quand on est de l'opposition,
and especially when one belongs to the Opposition,
avant de vouloir mettre de l'ordre
before wishing to arrange (settle)
dans les affaires de l'État,
the affairs of the State,
il faut en mettre dans les siennes.
one must first arrange one's own.
C'est ce que vous n'avez pas fait...
That is what you have not done.
Vous avez des dettes énormes
You have enormous debts,
près d'un million de France,
nearly a million francs,
que vos créanciers impatients et désespérés
which your creditors, impatient and desperate,
m'ont cédé pour un sixième payé comptant...
have sold to me for one-sixth, ready money.
J'ai tout racheté...moi, si avide, si intéressée...
I have bought them all, I, so greedy, so selfish.
Vous ne m'accuserez pas cette fois
You will not accuse me this time
de vouloir m'enrichir...
of wishing to enrich myself,
(*souriant*) car ces créances sont, dit-on, désastreuses...
(*smiling*) for these debts, they say, are ruinous,
mais elles ont un avantage...
but they have one advantage,
celui d'emporter la contrainte par corps...
that of carrying with them the right of arrest for debt,
avantage dont je n'ai pu profiter encore
an advantage which I have not yet been able to profit by
avec un membre de la chambre des communes...
with a member of the House of Commons...
mais demain finit la session,
but to-morrow the session ends,
et si la piquante anecdote dont vous parliez tout à l'heure
and if the pungent anecdote of which you spoke just now
paraît dans le journal du matin...
appears in to-morrow morning's paper,
le journal du soir annoncera
the evening paper will announce
que son spirituel auteur, monsieur de Saint-Jean,
that its witty author, Monsieur de St. Jean,
compose en ce moment, à Newgate,
is composing at this hour, in Newgate,
un traité sur l'art de faire des dettes...
a treatise on the 'Art of running into Debt.'
Mais je ne crains rien, monsieur,
But I have no fear, my lord,
vous êtes trop nécessaire à vos amis et à l'opposition
you are too necessary to your friends and the Opposition
pour vouloir les priver de votre présence,
to wish to deprive them of your presence,
et quelque pénible que soit le silence
and however painful silence may be
pour un orateur aussi éloquent,
for an orator so eloquent (as yourself),
vous comprendrez mieux que moi
you will understand even better than myself
encore la nécessité de vous taire.
the necessity of silence.

[*Elle fait la révérence et sort.*

[*She curtseys and departs.*

Scène VI.

Abigaïl, Bolingbroke.

Scene VI.

Abigail, Bolingbroke.

Abigail.

Eh bien ! qu'en dites-vous ?
Well ! what do you say to that ?

Bolingbroke.

[*gaîment.*

Bien joué, vrai Dieu !...
c'est de bonne guerre...
J'ai toujours dit que la duchesse
était une femme de tête et surtout d'exécution.
Elle ne menace pas ; elle frappe...
Et cette idée de me tenir sous sa dépendance
en acquittant mes dettes... c'est admirable !...
surtout de sa part...
Ce que n'auraient pas fait mes meilleurs amis,
elle l'a fait...elle a payé pour moi...
il faut alors qu'elle ait une haine...
qui excite mon émulation et mon courage...
Allons, Abigaïl, du cœur.

[*gaily.*

Well played, Egad,
it is fair play.
I have always said that the Duchess
was a strong-minded and above all a resolute woman.
She does not threaten, she strikes...
and this idea of having me at her mercy
by paying my debts is admirable,
especially for her.
What my best friends would not have done,
she has done ; she has paid all for me.
She must therefore nourish such a hatred...
as to excite my emulation and courage.
Come, Abigail, take heart.

Abigail.

Non, non...je renonce à tout,
il y va de votre liberté !

No, no, I give up everything,
your liberty is at stake.

Bolingbroke.

[*gaîment.*

C'est ce que nous verrons !
et par tous les moyens possibles...
(*Regardant une pendule qui est sur un des panneaux à droite.*)
Ah, mon Dieu ! voici l'heure de la chambre...
je ne peux y manquer...
je dois parler contre le duc de Marlborough
qui demande des subsides...
Je prouverai à la duchesse
que je m'entends en économie...
je ne voterai pas un schelling...
Adieu ! je compte sur Masham,
sur vous, et sur notre alliance !...

[*cheerfully.*

That is what we shall see
and by every possible means.
(*Looking at a clock on one of the panels to the right.*)
Good heavens ! It is time to go to the House (of Commons).
I must not fail to be there.
I have to speak against the Duke of Marlborough
who demands more subsidies.
I will prove to the Duchess
that I perfectly understand economy.
I will not vote him one shilling.
Good bye, I count on Masham,
on you, and on our alliance.

[*Il sort par la porte à gauche.*

[*Exit through the door on the left.*

ACT II.

Scène I.

La Reine, un huissier du palais.

Scene I.

The Queen, an Usher of the Palace.

* * * * * * *

The Queen.

Tant pis...
je suis fâchée de ne pas les avoir reçus...

That is a pity (lit. so much the worse).
I am sorry that I did not see them,

Monsieur de Saint-Jean, surtout !...
especially Monsieur de St. Jean !

Quand il était au pouvoir... tout allait au mieux... mes matinées étaient moins longues... je ne m'ennuyais pas tant... et aujourd'hui, en l'absence de la duchesse, cela se rencontrait à merveille... c'était comme un fait exprès... un bon hasard.—J'aurais pu causer avec lui, et l'avoir renvoyé, c'est d'une maladresse...

When he was in office, everything went on smoothly. My mornings were not so long. I was not so fatigued, and to-day, in the absence of the Duchess, they came so opportunely, it seemed as if it were done on purpose, a lucky chance.—I could have conversed with him and have dismissed him, it is very annoying.

Thompson.

Madame la duchesse me l'avait tant recommandé... règle générale : toutes les fois que monsieur de Saint-Jean se présentera...

The Duchess had strictly ordered me, as a general rule, everytime that Monsieur St. Jean presented himself--

The Queen.

Oh !...c'est la duchesse !... c'est différent ! Et monsieur de Saint-Jean n'a rien dit ?

Oh ! the Duchess ! That's quite different. Did Monsieur St. Jean say nothing ?

Thompson.

C'est lui qui venait d'écrire, dans le salon d'attente, le papier que j'ai remis à Votre Majesté.

It was he who wrote in the waiting room, the paper which I gave to your Majesty.

The Queen.

[*prenant vivement le papier sur la table.*

[*hastily taking the paper off the table.*

C'est bien.—Laisse-moi. [*Thompson sort.*

Very good. Leave me. [*Exit Thompson.*

The Queen.

[*lisant.*

'Madame, mes collègues et moi demandions audience à Votre Majesté ! Eux pour affaires d'Etat, et moi pour jouir de la vue de ma souveraine, qui depuis si longtemps m'est interdite.' Pauvre sir Henri ! 'Que la duchesse éloigne de vous ses ennemis politiques, je le conçois ; mais sa défiance va jusqu'à repousser une pauvre enfant dont la tendresse et les soins eussent adouci les ennuis dont on accable Votre Majesté. On lui refuse la place que vous vouliez lui donner près de vous, en alléguant qu'elle est sans famille ;

[*reading.*

'Madame, my colleagues and myself ask audience of your Majesty ! They for business of the State, and I to enjoy the sight of my Sovereign, who has been so long forbidden to me.' Poor Lord Henri! 'That the Duchess should keep away from you her political enemies,—that I can understand ; but her distrust goes so far as to drive away a poor girl whose tenderness and loving cares would have soothed the tediousness (ennui) which overwhelms your Majesty. They have refused her the place which you wished to give her about your person, by alleging that she has no family connections ;

et je vous préviens, moi, qu'Abigail Churchill est cousine de la duchesse de Marlborough.' (*S'arrêtant.*) Est-il possible ! ...(*Lisant.*) 'Ce seul fait vous donnera la mesure du reste... que Votre Majesté en profite et veuille bien en garder le secret à son fidèle serviteur et sujet, &c.' Oui, c'est la vérité. Henri de Saint-Jean est un de mes fidèles serviteurs... mais ceux-là, je ne suis pas libre de les accueillir... lui, surtout...ancien ministre, je ne puis le voir sans exciter la défiance et les plaintes des nouveaux ! Ah ! quand ne serai-je plus reine, pour être ma maîtresse ! Dans le choix même de mes amis, demander avis et permission aux conseillers de la Couronne, aux Chambres, à la majorité... à tout le monde enfin...c'est à n'y pas tenir... c'est un esclavage odieux, insupportable, et ici du moins, je ne veux obéir à personne, je serai libre chez moi dans mon palais. Oui, et quoi qu'il puisse arriver, j'y suis décidée. (*Elle sonne, Thompson paraît.*) Thompson, rendez-vous à l'instant dans la Cité, chez maître Tomwood, le joaillier... vous demanderez miss Abigail Churchill, et vous lui direz qu'elle vienne à l'instant même au palais. Je le veux, je l'ordonne moi, la reine !...allez !...

but I inform you that Abigail Churchill is a cousin of the Duchess of Marlborough.' (*Stopping.*) Is it possible ? ...(*Reading.*) 'This single fact will give you the measure of the rest. May your Majesty profit by it and be so gracious as to preserve the secret for her faithful servant and subject, &c.' Yes, it is true. Henri de St. Jean is one of my most faithful servants ; but those I am not free to receive, him especially—an old minister, I may not see him without exciting the distrust and complaints of the new ministers ! Oh ! when shall I no longer be a Queen to become my own mistress! Even in the choice of my friends, to ask the advice and permission of the councillors of the Crown, of the Houses, of the majority of everybody even, is unbearable. It is a slavery, hateful and intolerable, and in this, at least, I will not obey anyone, I will be free in my own house and palace. Yes, whatever may happen, I am decided upon it. (*She rings, Thompson appears.*) Thompson, go immediately to the City, to Mr. Tomwood's, the jeweller. You will ask for Miss Abigail Churchill, and you will tell her that she is to come immediately to the palace. I will it, I order it, I, the Queen ! Go !

Thompson.

Oui, madame. [*Il sort.*

Yes, Madame. [*Exit.*

The Queen.

L'on verra si quelqu'un ici a le droit d'avoir une autre volonté que la mienne, et d'abord la duchesse, dont l'amitié et les conseils continuels... commencent depuis longtemps à me fatiguer... Ah ! c'est elle !... (*Elle s'assied et serre dans son sein la lettre de Bolingbroke.*)

We shall see whether anyone here has the right to have any other will but mine, and in the first place, the Duchess, of whose friendship and everlasting advice I have long ago begun to grow tired... Ah ! here she is ! (*She sits down and thrusts into her bosom Bolingbroke's letter.*)

Owing to pressure on our space we are compelled to abridge the two French pieces 'Jeanne d'Arc' and 'Le Verre d'Eau.' In the November and December issues we shall therefore insert only the most difficult parts of each piece. Should any Subscriber desire further assistance we shall be happy to reply to any query upon receipt of a stamped and addressed envelope.

Mr. Vere Foster's Prize Competition.

We have just received the results of the competitions for drawing and writing annually awarded by Mr. Vere Foster for the encouragement of art. Since the institution of the prizes in 1870, 5,128 prizes have been given away, amounting to £2,354 7s. 6d., and the pupils of upwards of 3,800 schools of all classes have taken part in the competition, which has extended to every county and every large town in Great Britain and Ireland.

During the past year there have been 570 competitors in ordinary writing, 25 in plain and ornamental lettering, 288 in drawing, and 74 in painting. 403 boys have competed, and 491 girls, representing 22 counties in Ireland, and 46 in Great Britain.

The highest prize awarded for writing of copies of the original series has been awarded to Donald M'Dougall, aged 16, of Drumour Public School, Perthshire. The second prize is awarded to Mary K. Kavanagh, aged 10, Monasterevan, Kildare. In drawing and painting the work continues to be very satisfactory, for though the quality of the work done has often been exceeded there never has before been so large a quantity of good work, and such an absence of rubbish. This has resulted in a great addition being made to the number of prizes originally offered. We append the names of those who obtained the most valuable prizes. Hamilton, James T.; Martin, Anne J.; Fleming, Agnes; Aikman, W. K.; Richards, Lucy, E.; Butcher, Adah; Powell, R.; Gebbie, Frank; Coath, Helen; Hamilton, E.; Jenkins, G. H.; Nash, A. J.; Ferrier, May; Jones, Lionel J.; Carder, W.

For the annual competition in 1889, prizes for writing and lettering are offered to the extent of £269; for drawing and painting, £356. Full particulars can be obtained from Messrs. Blackie & Sons, 49 & 50, Old Bailey, London.

Publications Reviewed.

A Treatise on Plane Trigonometry containing an account of Hyperbolic Functions.

By John Casey, LL.D., F.R.S. London: Longmans, Green and Co.

The book which we have before us contains, we believe, the most remarkable and complete treatment of its subject which has yet appeared in the English language. Too many writers have supposed that a knowledge of Trigonometry only was necessary to enable them to write a book thereupon, and it has been rare indeed that a writer in every direction as competent as Dr. Casey, or with a mathematical eye-sight so far-reaching, has grappled with an elementary subject like the present. Dr. Casey, fortunately for us, was known as an eminent mathematician before he became a writer of text-books. His investigations into Geometry and Higher Algebra have gained him a European reputation, and when the first of his class text-books, the 'Sequel to Euclid,' appeared some years ago we welcomed it in these columns as 'extraordinarily neat' and extremely satisfactory even in the form it then assumed, which has since, in subsequent editions, been improved almost out of all likeness to its former self. This was followed in the course of last year by an equally remarkable treatise on Analytical Geometry, and it is little to be wondered at, therefore, if we open the present volume with very high anticipations. Nor are we disappointed. Alike in grasp and clearness this book out-distances its only real rival, the venerable Todhunter. Of course we cannot help differing in a few minor points from our author, but on the whole we are more at one with him than we have been with any previous author.

The examples, more than a thousand in number, are remarkably well-chosen and accurate. They are adapted not only to form a Trigonometrician but also to develop a comprehensive mathematical talent. Many of them are original and at least one third have not appeared in any previous text-book. In every case some are solved as specimens (a point in which all Todhunter's works, by the way, are very deficient) and the answers of the remainder are given at the end of the book where we have the welcome novelty of a tolerably complete index of the subject-matter, and authors' names.

By making a short survey of the work we shall be enabled to convey to our readers some idea of its scope and contents, and also to criticise a few of the details. The Trigonometrical ratios are defined as lines in a circle of unit radius, and this is clearly the definition which Dr. Casey prefers, although the ordinary ratio definition is also given. Here we are seriously at issue with our author for we think this definition dangerous in the extreme (since the schoolboy will promptly forget the unity of the radius) and believe that it ought only to be admitted as explaining the primary signification of the terms *sine*, *tangent*, &c. A natural result of this definition, to which we also object as extremely likely to prove misleading, is that such phrases as 'sine of the arc,' &c., are in constant use. In finding the formulæ for the ratios of the sum of two angles two proofs are given which are new to ordinary text-books, one a deduction from Ptolemy's Theorem (VI. D.) and another due to Mr. Nichols. Besides this we find, of course, the ordinary proofs and a neat and easy proof for angles of any magnitude, so that here we have almost an *embarras de richesse*. It might have been as well, perhaps, considering the geometrical tendencies of examiners, to add proofs by geometry as well as the analytical ones given, of the formulæ numbered (96)—(98), (157)—(160), and a few others, all of which are susceptible of neat and instantaneous treatment thereby. In Art. 61, a verbal statement of a rule is given very dangerously and inexactly, as follows—

'Diff. of the cosines = 2 sin ½ sum, sin ½ diff.'

and no notice board is erected at the mouth of the pitfall of signs which lies hidden here. A slight discussion of the rational basis for the use of the inverse notation might quite well have been added (to Art. 30), a hint, we mean, such as Todhunter gives, that the use of the index -1 here differs only from its ordinary use in that the subject of its operation is a function, not a quantity. As it is we fear that the student may confuse

$$\mathrm{Sin}^{-1} x \text{ and } (\sin x)^{-1}$$

The methods of Delambre and Maskelyne for finding the logarithmic sines of small angles are relegated to the examples. We should have liked a line pointing out the use to which their authors applied these theorems, more particularly as Maskelyne's method is the one adopted in Chambers' widely used Mathematical Tables. The Properties of Triangles are rather curtly treated. Too many references to the 'Sequel to Euclid' are made, and we have not noticed that it is anywhere stated which edition of the 'Sequel' is meant. We confess that we think that Dr. Casey might with advantage have lengthened his book 20 or 30 pages, by giving an elementary account of the Geometry of the Triangle, complete in itself, referring to the 'Sequel' only for the more recondite propositions. We are glad to notice that mention is made of the Brocard Points, and of Malfatti's Problem. But surely the Nine Point Circle ought to have been introduced although its treatment is so largely geometrical. In the figure on p. 176, the angles into which the angle A is sub-divided are

wrongly designated. They should be as in the figure on p. 177. The section on Maxima and Minima might be extended so as to include those problems on this subject which can be solved by making equal the roots of a quadratic equation in the variable. This would admit a large class of interesting examples which are at present excluded. A formula, due to Bretschneider, is given for the area of any quadrilateral in forms of sides and diagonals. We think that some proof of the more important results of De Moivre's Theorem which does not involve the use of imaginary quantities is desirable. Two pages are given to the Binomial Theorem, we can scarcely see why. We are glad to notice the introduction of Bernouilli's numbers and the proof of their chief properties. A reference should be added after Ex. 42 on p. 214 to Exx. 6, 7 on p. 229, where other properties of the numbers are proved. This is also omitted from the index. If this were done we should be provided with a tolerably complete résumé of their properties. Chapter VIII., pp. 241—259, is given to a remarkable and elegant discussion of 'Hyperbolic Trigonometry.' Dr. Casey adopts sh, ch, th instead of the more usual sinh, cosh, tanh. We should suggest however that it is *extremely* advisable for teaching purposes to have names which are capable of being pronounced, and should recommend that in any subsequent edition Dr. Casey should introduce such, and we believe that his lead would be followed. There are two misprints in line 4, p. 209, but as a rule the printing is extremely careful and accurate. We believe that for the printer's sake the use of the rectangular sign for factorial should be abolished in favour of the recent Cambridge substitute of ! In Exx. XXXVII., 23—27, 51 it should be stated that primes only are involved in the dexter. The result of Art. 184 might profitably be stated in words inasmuch as it is extremely useful to remember it.

We have by no means adverted to all the points which we had marked for notice, but we must conclude. We wish the book all success. We have mentioned many points, most of them small, on which we believe it to be capable of improvement, but we repeat that it is in our opinion not only the best book on the subject but that it is an eminently good book.

A School Grammar. By David Salmon. London: Longmans, Green and Co.

Mr. Salmon has written a thoroughly serviceable School Grammar. In a book of 260 pages, he has provided abundance of exercises of such a kind as to be easily read and understood by young children. That it may be seen how copious are the examples, we notice that the first fifty pages are taken up with the parts of speech and exercises thereon, based upon the principle that examples must lead up to definitions, and definitions be applied to examples. The second part, which deals with the classification and inflexion of nouns, is fully treated. Some exception may be taken to the statement that the active voice belongs only to transitive verbs. If voice is a form of the verb, and the active voice receives its name because the verb shows that the person or thing named by the subject is acting or doing, then intransitive verbs take this form, although they do not take the passive form. But even intransitive verbs do take the passive form when a preposition is joined to them. It does not mend matters by saying that Intransitive Verbs might be spoken of as of Neuter Voice. Mr. Salmon has followed Dr. Morris in his divisions of verbs into strong and weak, classing as weak verbs those which, although forming their past tense and perfect participle by adding -t or -d, also change the vowel sound. Mr. Salmon defines strong verbs as those which form their past tense and perfect participle by a change of vowel sound. We are of opinion, therefore, that it not only simplifies matters very considerably, but is quite allowable to call those words which do both, irregular or strong verbs. *Light, lit, lit; sell, sold, sold; speed, sped, sped,* may be given as examples of verbs which we think may very justly be called strong verbs, and not weak. Mr. Salmon gives a very full division of the tenses of verbs as the divisions present, past and future indefinite imperfect, perfect and perfect continuous will show. We are glad to note, however, that he does not insist upon this minute subdivision as of special importance, except as being useful to show the various shades of meaning which may be conveyed in composition by means of auxiliaries. Even these minute subdivisions do not include all which may be formed if the word *do* is treated separately when used as an auxiliary. We notice that Mr. Salmon has introduced an exercise for the correction of bad grammar. We are very strongly of opinion that such exercises are of very great service, every error being capable of correction on fixed principles. The principles themselves become more firmly fixed in the mind by the necessity for their application in incorrect sentences being called to mind. We should be glad to see the practice more frequently followed in this subject. We commend very heartily the volume which Mr. Salmon has produced. Every teacher will find in it abundance of work, both oral and written, for his classes.

A First History of the English People. Four Volumes. By Amy Baker. London: Swan, Sonnenschein, Lowry and Co.

We do not remember reading any book of history for schools with such keen pleasure as we have derived from the perusal of these four volumes of Miss Baker. The style is attractive, because it is picturesque and vivid, and in some portions, as in the reign of William III., even rapid and exciting. It is based, as the writer acknowledges, on Green's 'Short History of the English People.' But while its style may be traced in part to its forerunner, it has special merits of its own in being simpler and better adapted to the intelligence of beginners in historical study. For it must be understood that Miss Baker's work is less ambitious in its aim and less comprehensive in its scope than Green's 'Short History.'

Chapters adapted from Kingsley's 'Hereward,' Lytton's 'Last of the Barons,' and other works of the kind, enliven the course of the narrative, and help the young reader more nearly to realise the sort of life led by the English of former times.

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We note with pleasure the well-chosen poetical mottoes which head the various chapters; and the mnemonic verses appended to each volume, written by the Miss Ella Baker whose sad death was recently recorded, are far superior to most verses of the kind.

A few slight errors need correction. On page 57 of Volume I. the name Edmondsbury is spelt two ways in one paragraph, and in the heading of Chapter 57 the date of James I. is printed 1630.

The volumes present a neat appearance, and the work is one we can most heartily commend.

History and Geography Examination Papers. Compiled by C. H. Spence, M.A. London: George Bell and Sons.

The notion of duality seems to be a feature of this collection of questions. They relate to two subjects, Geography and History. The questions on each of these subjects are arranged in two main sections, the first consisting of papers of questions, original or selected, on special portions of the subject, and the second including a number of papers set in recent years at the Cambridge Local, London University, Civil Service, Preliminary, Army, and other examinations. The book is intended to be useful to both teachers and students, and for each it has a two-fold object. For both it is calculated to suggest points for special study or instruction; and while it may save the teacher the trouble of making suitable questions

to test his pupils, it will provide the student with abundant means of practising for an examination. Most of the questions are such as demand thoughtful treatment as well as knowledge of facts; and, remembering the old dictum that 'a wise question is the half of knowledge,' we cannot doubt that such a well-chosen collection of questions will prove of real value to anyone who makes a reasonable use of it. We append two or three questions as samples to justify our remarks.

'What causes (physical, moral, and political) have led to the prosperity of the United States?'

'Show how position and nature of the soil determines the occupation and population of different districts in the British Isles.'

'Explain how and why the English conquest of Britain differed from the Frankish conquest of Gaul.'

'The influence of the Wars of the Roses on the social and political life of England.'

Lamb's Tales from Shakespeare. Edited by Alfonzo Gardiner. Manchester: John Heywood.

Mr. Gardiner explains his purpose in sending forth this edition of a selection of Lamb's Tales in the following words:—'In preparing this selection of eight of the "Tales" three objects have been kept in view—(*a*) to present to our young people Charles and Mary Lamb's version of what are considered to be Shakespeare's masterpieces; (2) to give such needful explanations as shall make the language and the allusions intelligible to the young readers; (3) and to show the moral lessons that Shakespeare's plays enforce.' The first of these aims has been carried out by printing, almost entirely without alteration, the text of the tales as left by Lamb and his sister; the second, by placing at the foot of the pages notes explanatory of names, allusions, and words now little used; and the third, by a note placed at the end of each tale, embodying the opinions of eminent writers on the mind of Shakespeare. The text is beautifully printed; and the notes, though not numerous, answer their purpose very well. We think, however, that they would have been quite as serviceable at the end of the play, while the uniformity and chasteness of the pages would not have been, as now, interfered with.

The volume is strongly but very neatly bound, and would do service either as a prize, or as a reading book for schools.

Plotting, or Graphic Mathematics. By R. Wormell, D.Sc., M.A. London: Waterlow and Sons.

Dr. Wormell's book is, we believe, a new departure, and it is therefore difficult to adequately estimate its value as an educational instrument, because it has not been tried as such except by the author. Practically, it is an attempt to apply the methods of Froebel to the subject of Analytical Geometry. We will pass its contents shortly in review, as perhaps the best means of showing our readers whether it is likely to suit their purpose. It begins (pp. 3—16) with preparatory exercises, to give facility in the use of ruled, or 'logarithm' paper, showing how this may be used in designing decorative patterns, by filling in the various squares according to some symmetrical system, how plans or drawings may be copied by it to scale, diminished or increased, and how certain simple results in the theory of numbers follow by means of it, such as that the sum of the odd numbers, from unity upwards, always forms a square. The sections here given on triangular, pyramidal, and figurate numbers seem to us altogether out of place. Then we come to the main body of the work. The system of co-ordinates is given for the case when both are positive. We are shown how to find areas, and a glance inside a surveyor's field-book is accorded. Chapter II. shows the application of these methods to proportion—and of course it is here necessary to assume a knowledge of Euclid's Sixth Book. Chapter III. introduces us to the complete system of rectangular co-ordinates, and explains the significance of an equation between them. An equation is known by its fruits, for Dr. Wormell plots out a number of points upon it, and opines by the look of the result that it is a line or circle as the case may be. Chapter IV. introduces us to the paths of moving points and projectiles, leading on in the next chapter to a discussion of the parabola, which is followed by the ellipse and hyberbola, while a few instances of 'Higher Graphs and Curves of Observation' complete the book. We can say more easily perhaps what the book will not serve for than what it will. It will not do as an introduction to Analytical Geometry. It will not do, we think, even for the perusal of any but the science student, whose sole wish in acquiring co-ordinate geometry is to be able to plot out the various pressures of his steam engine,&c.,&c., with a view to finding the curve of pressure. Perhaps it may be useful in such a case as this, but we are inclined to question whether a book need have been devoted to so small an object which an hour's talking by a good teacher might have attained far better. 'Graphic Mathematics' is surely, in any case, a too high-sounding title, inasmuch as it must lead anyone who knows anything about the subject to anticipate some discussion, at all events, of Graphic Statics and other methods, which he will certainly fail to find.

Greek Testament Selections. By A. M. M. Stedman, M.A. London: G. Bell and Sons.

This volume has been prepared, the author tells us in the preface, for use in schools where it is found impossible to read in a term more than a small portion of the Greek Testament.

When the first edition of this useful book was published we ventured to predict that it would be highly appreciated and widely used. Such has been the case. A new edition has been called for, and a much enlarged and improved edition has been issued. There has been added an introduction, notes, and vocabulary. Of course the vocabulary has rendered the book much more handy for a school-boy to use. Nor will those fail to appreciate it who know but little Greek, and yet wish to read the New Testament in the original. The paper, printing, and binding are alike excellent. Now, even more than before, we recommend these Greek Testament selections to the notice of teachers and students. It was a capital idea, and has been most successfully wrought out.

Lessons in Elementary Mechanics. Specially adapted to the requirements of the Revised New Code. Second Stage. By W. H. Grieve, P.S.A. London: Longmans, Green and Co.

Mr. Grieve has modelled his book very strictly and conscientiously upon the lines of the New Code, which, it will be remembered, prescribes for the second stage the following subjects:—Matter in motion; the weight of a body, its inertia and momentum; measures of force, work and energy; energy may be transformed, but cannot be destroyed; heat as a form of energy. On the whole we are able to congratulate our author upon the considerable success attained. The book is well got up, clearly printed, and provided with 121 illustrations, most of which are entirely to the point, though some few seem to have been really intended for the pages of *Funny Folks*, or other such magazine, and to have strayed hither by accident. We think that this last point is decidedly a mistake in books adapted for school use. The risible faculties of schoolboys are near enough to the surface, and the elegant picture of two gentlemen coming incontinently into collision at a corner of a street, while a dog barks briskly at a blank wall, is not unlikely to provoke more merriment than study of the third law of motion, which is darkly hinted at therein. We strongly advise the omission of Fig. 64 (fat boy jumping stream), Fig. 68 (the same, as circus-rider, jumping through a hoop), Fig. 81 (advertisement for Crystal Palace), and several others. Apart from

this, we have little but praise. Everyone who has tried the task knows how really difficult it is to render lessons in Elementary Mechanics interesting, and how necessary it is to be provided with a large store of instances and illustrations. Mr. Grieve provides these admirably, and adds to the teacher's indebtedness by putting some 20 questions, mostly well-chosen and to the point, at the end of each of his 17 chapters. The book concludes with some examination papers, and answers are given to those questions which are numerical. Everything, so far as we have noticed, is very accurate. We dislike the definition given of 'force.' It ought to be more clearly stated that force is recognisable as such when it *changes*, as well as when it *produces* or *prevents* the motion of a body. The grammar of the explanations is not always all that can be desired—*e.g.*, on p. 105 we read, 'If the young reader *would* only pursue . . . he *will* there find, &c.'

Arithmetical Exercises and Examination Papers. By H. S. Hall, M.A., and S. R. Knight, B.A. London: Macmillan and Co.

This book can be used separately or with any text book on Arithmetic. It contains eighty progressive exercises, embracing six hundred and forty questions in the higher rules of Arithmetic, followed by fifty of the most recent public examination papers of various kinds, and two hundred miscellaneous examples in Logarithms and Mensuration. A list of formulæ in Mensuration and of numerical constants is also given. The questions are thoroughly practical, and afford ample scope for thought on the part of the pupil. It is just such a book as should be in the hands of a teacher who has the preparation of pupils for many different examinations on his hands, or of an educator who wants to vary the practice provided by an ordinary text book. Pupil teachers would also find it very useful; the last section especially furnishing a capital sequel to the higher rules of Arithmetic.

A Short Text Book on Sound, Light, and Heat. By Thomas Dunman; revised and completed by Chapman Jones, F.I.C., F.C.S., &c. London: Ward Lock and Co.

The chapters that appeared in the *Universal Instructor* upon the subjects of Sound, Light, and Heat, have for the convenience of students been issued separately. The death of the author of these chapters made it necessary for the work to be completed by other hands. No attempt, we learn from the preface, has been made to suit the book to the syllabus of any examining body. It is believed that it will be found a suitable guide for students who are preparing the elementary examinations in physics. The print is rather small, and the diagrams are not of the best, though it is only fair to say that they are abundant and sufficiently clear to illustrate the subject. We believe a very fairly successful attempt has been made to express in a popular style most important facts and principles of the subject. Those who knew the author and heard his lectures will doubtlessly derive great pleasure from this permanent record of his instruction.

Commercial Mathematics: Arithmetic and Algebra. London: Longmans, Green and Co.

This book has been produced for the use of candidates preparing for the new commercial examinations to be held under the Oxford and Cambridge Schools Examination Board. The section on Arithmetic is rather brief, but it includes a fairly full account of the decimal system of France, a chapter on the money, weights, and measures of the most important countries of the Continent, and another on exchange.

Algebra is dealt with at greater length, but is limited to the rules up to involution and evolution, including simultaneous equations and greatest common measure.

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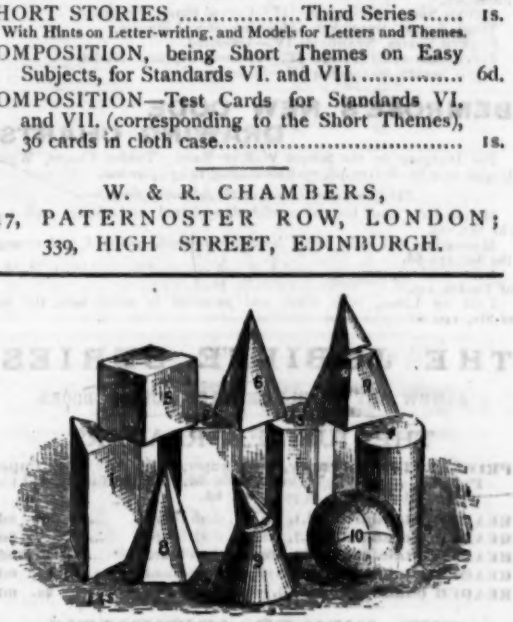

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